

# The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

VOL. IV.

JANUARY 22, 1921

No. 84

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**NOTICES:**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- abroad. Cheques, P.O.O.'s, and Postal Orders should be made payable to Benn Brothers, Ltd.

Editorial & General Offices—8, Bowyer Street, London, E.C.4.  
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines)

## Eliminating the Middleman

SOME rather alarming announcements have recently appeared in the Press respecting a movement, supposed to have been started under departmental auspices, for the elimination of the unnecessary middleman. The idea is said to be based on the experience gained by the Ministry of Food in the distribution of commodities during the period of control. According to one authority, the matter is now to be taken up generally as affecting all trades, the official view being that the existence of so many intermediaries between the source of production and the consumer is too costly a system, and that the whole business of supply should be carried on through highly organised departmental concerns. After some recent experiences of "highly organised departmental concerns" the prospect is most alluring. Under the inspired management of our transport system by Sir Eric Geddes, we are already blessed with doubled fares and a service, whether goods or passenger, many degrees less efficient than before the war. His colleague, Mr. Illingworth, has driven the telephone users into revolt by the threat of heavily increased charges on business men with no guarantee of any better service. And now we have the prospect of Mr. McCurdy offering his

unrivalled experience of food regulation to the country and proposing to get rid of the merchant race, who have done more than any other class to build up the commercial supremacy of Great Britain. It would be an entirely comic spectacle but for the serious menace contained in it. The growth of bureaucratic control in every department is one of the most disquieting features of national life, and the vigorous protest which Lord Askwith made against it last week will be warmly welcomed by all business men.

Our only hope in this matter is that these rumours respecting departmental control of distribution are greatly exaggerated. They may be traced back, we believe, to an announcement which appeared in the *Board of Trade Journal* of December 23 last. It was there stated that on December 15 a first meeting was held of a conference of certain members of the Central Committee under the Profiteering Acts, which was called to enquire into the subject of the multiplication of transactions in the distribution of commodities. Investigations under the Profiteering Acts had, it was stated, revealed instances where commodities in universal demand had been unnecessarily passed from hand to hand with a profit at each transaction. At the request of Mr. John Murray, M.P., Chairman of the Central Committee, Mr. Marshall Freeman consented to preside over the conference, which includes representatives of the National Chamber of Trade, the Consumers' Council, various trade associations and other bodies, and will meet from time to time until its enquiries are completed. It has been decided to invite evidence from commercial and trading organisations all over the country, as well as from individual traders, and the conference is prepared to receive in writing any information bearing on the question from members of the public. Communications on the subject may be sent to the Secretary, The Central Profiteering Committee, at 54, Victoria Street, Westminster, S.W.1. The conference stood adjourned until Thursday, January 20.

So far as is known, it is not proposed to interfere with the process of distribution in the chemical trade, though as a safeguard it might be desirable for organisations interested in the matter to keep an eye on developments. There has been a suspicion for some time past that Government departments have not been unduly sympathetic towards the distributing interest. It is but fair to add that no specific evidence has been produced in support of this theory, though the suspicion is certainly not weakened by the constitution of the Dyestuffs Act Advisory Committee. What is more probable is that Government departments follow the line of least resistance, and, to some extent, allow themselves to be influenced by the interests which exert the greatest pressure. The remedy, of course, lies in a persistent course of worrying until redress is obtained by any neglected interests.

### Chemical Publications

THE Federal Council for Pure & Applied Chemistry, which has been considering for some time the question of chemical periodical literature, has at last produced a memorandum which reduces its ideas to definite terms. This quite dispels the popular fallacy that the scientific, like the literary, man is indifferent to considerations of finance, for quite a considerable portion of the document is applied to the £ s. d. of the problem. The Society of Chemical Industry, we are reminded, draws a much larger income from advertisements than from the annual subscriptions of its members, and the *Journal* is described as "our greatest asset." With the disappearance of the Excess Profits Duty, it is anticipated that advertisement matter will be more difficult to obtain, and that further increases of subscriptions will be necessary in the near future. The inquiry as to the possibility of securing both economy and efficiency by co-operation in the matter of publications is confined to the Chemical Society and the Society of Chemical Industry, and the object has been to discover how the incomes of the two societies can be so expended as to yield a greater return to their members.

The primary conclusion of the Council is that, in view of the series of publications issued and the editorial establishments maintained by these two Societies, economies are possible. Further, they point out, "the fact that information of ephemeral or popular interest only appears fortnightly in the *Journal of the Society of Chemical Industry*, has led to the appearance of weekly journals under private control which convey such information more promptly and, in addition, gain support from the more frequent distribution of advertisement matter; this factor naturally depreciates the value of the journals of the Societies as advertising media."

For the future it is suggested that the *Transactions* of both Societies should be continued separately, and issued monthly in their present form. Next there should be a joint fortnightly publication, *Chemical Abstracts*, scientific and technical, purporting to be a complete collection of abstracts of original papers and patents, together with a list of books, Government reports and the like; a joint annual report on the progress of pure and applied chemistry; and a list of members of the chemical profession with their addresses and an indication of the societies to which they belong. The last, it is said, could be made an indispensable chemical directory, with particulars of chemical companies, similar to those given in the Stock Exchange Year Book. Its wide circulation, it is hopefully suggested, would make it a valuable advertising medium, and it "might thus pay for itself."

Perhaps the most interesting proposal is the final one—the issue of a weekly journal, containing the proceedings and notices of both societies, general summaries, reports of meetings, notices of books, parliamentary and legal information, company reports, market prices, notes of appointments, letters from correspondents, and the like; in short, a weekly trade newspaper. Here, again, the financial prospects are considered rosy. Such a publication, it is said, should be "more valuable for advertising purposes than our

present journals." The whole scheme is interesting and indicates the application of much thought to the problem of supplying all the needs of the members. The capture of the advertiser is, perhaps, a more central purpose than might have been expected; but there is no concealment of the commercialism of the scheme, and probably the authors of the document deplore as much as anyone the necessity for this constant thought of profits. At the best the scheme may result in an improvement of our current chemical literature and in necessary economies. At the worst, those who courageously embark on such new publication schemes in these especially difficult times will have the consolation of the landowner who farms his own acres—they will know exactly how much they lose.

### An Important Concession

THE recently established Chemical and Dyestuff Traders' Association may be congratulated on the successful result of its negotiations with the Board of Trade in reference to the relaxation of restrictions on exports. It is officially announced that the Licensing Section of the Board of Trade are now prepared to grant export licenses for reasonable quantities of practically all dyestuffs and intermediates, except benzol, to firms who have the materials actually in stock. This is an important concession to merchants. Hitherto, as regards home-manufactured alizarine, anthracine, rhodamine, &c., it has been the practice to insist on the production of a manufacturer's certificate as a condition for an export license. This condition apparently will be enforced no longer. It was imposed in the first instance to guarantee adequate supplies for the home market before permission could be given for export, but like other well-intentioned provisions its effects occasionally exceeded the original intention. The Board of Trade's welcome concession is probably due to the fact that considerable quantities of stuff are known to be in stock for which there is no pressing demand at home. The home manufacturer gains nothing from the holding up of such stocks, whereas, if it is allowed to be exported, the merchant benefits and the nation gains in proportion. The Board of Trade has applied commonsense to the situation, apparently concluding that the advantages of removing the existing restrictions outweigh the risks. At the same time it will no doubt see that the home market is not denuded of necessary supplies in order that traders may export at higher prices, and the responsible class of traders will recognise that it is to their interest to see that the concession is not exploited or abused.

### The Advisory Committee

THE Advisory Committee to be set up under the Dyestuffs Act threatens to resemble the boy who refused to grow up. The Act came into operation last Saturday, but so far no official announcement has been made as to its committee. Various names, however, have been suggested, and if rumours may be trusted both the manufacturers' and the consumers' representatives have been chosen. The former, it is said, include Mr. Woolcock, M.P., general manager of the Association of British Chemical Manufacturers—

a choice anyone might have safely predicted; Mr. E. V. Evans, a prominent figure in the Society of Chemical Industry, a member of the British Chemical Mission to Germany, and a chemist whose connection with the South Metropolitan Gas Co. has brought him into practical association with dyestuffs manufacture; and Mr. Whittemore, an official of the British Dyestuffs Corporation. As to the consumers, Mr. Vernon Clay (the Colour Users' Association), who was one of the parties to the "agreed scheme," may be accepted as a certainty, and the other four, not quite so well known outside their own circles, are reported to be associated with the Bradford Dyers' Association, the Calico Printers' Association, the Paint & Colour Trades' and a northern chemical company. The consumers' section is not unnaturally drawn almost entirely from Lancashire and Yorkshire, the centres of the textile industry. As to the remaining three independent members (one to be the chairman), we have heard various suggestions, but it is premature to disclose the reported names at this stage. Probably some natural difficulty is being experienced in the selection of the right man, but the delay in connection with the constitution of the Committee supplies rather a contrast to the speed with which the Bill was passed.

### Asphaltenes in Lubricating Oils

WITH lubricating oils standing at their present level, there is every need for the consumer to be able to protect himself against the supply of an indifferent article. While ordinary laboratory tests may have their value, they certainly cannot be described as conclusive, and in many instances a true indication can only be gathered from a fairly prolonged practical test. Probably, internal combustion engines provide the most difficult problem in lubrication, owing to their speed of operation and the high cylinder temperature which is produced by the combustion of the fuel. Lubrication is one of the few subjects upon which we are not overburdened with literature, and for this reason papers dealing with any specific theories or new developments are of measurable value. Elsewhere we give an abstract of the views of Mr. Frederic Garner submitted to a meeting last Tuesday of the Institution of Petroleum Technologists, and it will be noticed that he has drawn some helpful conclusions in connection with the decidedly aggravating effect of carbonization as applied to oils. The degree of carbonization is usually a function of the asphaltene content of the original oil, and although these bodies are formed from mineral oils at ordinary temperatures under certain conditions, it is only above 150°C. that the process proceeds with comparative rapidity. The decomposition of oil in an engine can occur in two ways, namely, by rapid carbonization due to exposure of the mist to the explosion flame, thereby causing incomplete combustion of the oil, and also by gradual carbonization of thin oil films on such parts as the piston and cylinder head, giving first an asphaltic material and finally free carbon. It is upon the oil mist in the combustion space rather than upon the oil film on the walls that carbon formation is mainly dependent.

Mr. Garner has evolved a method of determining the asphaltic resins in lubricating oils by utilizing the selective absorbent power of animal charcoal for these

resins, and it is the latter which mainly influence the extent of carbonization at higher temperatures. A number of useful deductions as regards the influence of various properties have been drawn, and it is to be noted that the amount of asphaltene formed by heating an oil is dependent upon the boiling point range, and the impurities present in the original product. In general, the higher the boiling point the lower is the tendency towards carbonization under the same conditions. The action of high temperatures on oils is mainly an oxidation process, for asphaltenes are formed only slowly out of contact with air. At the same time it is probable that asphaltic resins act catalytically in accelerating the carbonization process, in the same manner as with the oxidation of paraffin wax to fatty acids the oxidised product is believed to act as a catalyst.

### The Calendar

Jan.		
24	Chemical Association: "The Founders of Chemistry," by W. E. Abbott. 4.30 p.m.	Royal College of Science, Dublin.
25	Society of Chemical Industry (Glasgow).	Technical College, Glasgow.
26	Society of Arts: "The Origin and Development of the Research Associations established by the Department of Scientific and Industrial Research," by A. Abbott. 8 p.m.	John Street, Adelphi, London.
27	Royal Institution of Great Britain: "Biochemistry," by Arthur Harden.	21, Albemarle Street, London, W. 1.
28	Chemical Society: "Langmuir's Theory of Atomic Structure," by D. A. Spencer.	Royal College of Science, South Kensington, London.
28	Royal Institution of Great Britain, "Cloudland Studies," by Sir James Dewar. 9 p.m.	Albemarle Street, Piccadilly, London.
Feb.		
1	Hull Chemical and Engineering Society: "Notes on Chemical Engineering," by A. R. Warnes. 7.30 p.m.	West Street, Hull.
2	Society of Public Analysts: Annual General Meeting. Papers by F. W. Smith, W. Lowson. 8 p.m.	Burlington House, Piccadilly, London.
3	Society of Public Analysts: "The Dyeing of Paper," by Julius Huebner.	Yorkshire.
4	Society of Chemical Industry (Manchester Section): "The Utilisation of Subsidiary Alkaloids," by Professor F. L. Pyman. 7.30 p.m.	Grand Hotel, Manchester.
5	Mining Institute of Scotland ...	Edinburgh.
14	Royal Society of Arts: "Applications of Catalysis to Industrial Chemistry," by Eric R. Rideal. 8 p.m.	John Street, Adelphi, London.

### Books Received

- HANDBOOK OF METALLURGY. By Dr. Carl Schnabel. Vol. I. third edition. (London: Macmillan & Co., Ltd.) Pp. 1171. 40s. net.
- VOLUMETRIC ANALYSIS. By Charles H. Hampshire. Third edition. London: J. & A. Churchill. Pp. 124. 7s. 6d. net.
- THE FUNDAMENTAL PROCESSES OF DYE CHEMISTRY. By Dr. Hans Eduard Fierz-David. London: J. & C. Churchill. Pp. 240. 21s. net.



## Colloid Chemistry of Tanning.\*

By Professor H. R. Procter.

THE conversion of skin into leather is an art dating back many thousand years, and the group of phenomena now classed as capillary or colloid has also been long known, though the relation of the two is a matter of modern knowledge. Under these circumstances it is difficult to know where to begin the discussion, and the question is further complicated by the work of the present writer and his pupils, who have recently shown that much which has been attributed to the surface-action which is implied in the name "capillary chemistry" is really subject to more general laws, and can be fully explained by mass action, electro-chemical attraction, and osmotic pressure. The title must therefore be taken, with a wider meaning than its etymology would imply, to include much physical chemistry, complicated, however, by structure and the special properties of colloids.

The skin is constituted of collagen (probably a polymerised anhydride of gelatine) and physically is a network of fibres of colloidal jelly. These gelatinous fibres in the dried raw hide adhere together to form an almost homogeneous horny mass, and the problem of the tanner is so to treat them, either by chemical change or by surface-coating, as to prevent their adhesion so that on drying they remain isolated and free to move, and the skin consequently flexible and porous, and at the same time without tendency to putrefactive change. The methods employed by the tanner, though very similar in their effects, are so various that no single explanation, physical or chemical, will cover all of them; and often various actions are combined to produce the desired result.

The question is still an open one whether the colloid is in the form of "micellæ" (submicroscopic particles) or of large conjugated or polymerised molecules, but this is mainly a matter of terms, and it is at least clear that the mixture is so intimate that both constituents are within the range of molecular and electro-chemical forces.

### Investigations with Gelatine

The colloid most fully investigated in this relation is gelatine, which in its chemical constitution is almost identical with hide fibre, while its homogeneous character renders exact quantitative study much more possible. Soaked in water at laboratory temperature, it does not dissolve, but swells to a definite volume dependent to some extent on the particular sample and the temperature. When the temperature is raised above 25°, the jelly melts and becomes miscible in water in all proportions, though even when diluted considerably beyond its original equilibrium volume, it still "sets" on cooling to a coherent elastic mass. Gelatine, both as jelly and solution, always shows a slight Tyndall effect, reflecting a beam of light sideways; but the ultramicroscope shows no defined particles. Arisz† has shown that the Tyndall effect increases with concentration and with lowered temperature, but without any break or sudden change at the setting point. The viscosity shows a similar increase, with no actual break, but a rapid rise at the temperature of gelatinisation, below which it speedily becomes too great to measure by ordinary methods. Both these effects are reversed on gradual heating, but there is a "lag" in both directions, a cooling solution only acquiring its full viscosity and Tyndall effect after the lapse of considerable time, which may even extend to weeks, but below 60°, given time, the process seems completely reversible. Above 60°–70° some permanent change takes place (hydrolysis or depolymerisation) which results in lowered viscosity, Tyndall effect, and setting power. These facts are best explained by the hypothesis that below 60° the gelatine solution is one of molecules or small molecular aggregates, which, as temperature falls, gradually unite to form larger ones, and at the setting point unite to a complete molecular network analogous to a mass of tenuous crystals. Cases are known in which such crystalline masses closely simulate colloid jellies. Time is of course needed for this rearrangement, as it is for actual crystallisation, and owing to the size and comparative immobility of the particles, rearrangement is very slow.

Proteids, among which gelatine must be included, are now known to consist of open or closed chains of amino acids, linked by the carboxyl group of one to the amino group of the next with elimination of  $\text{OH}_2$ . In closed chains, groups within a single molecule, forming terminal amino and carboxyl groups are also similarly united ring-structures. In this case the molecule is electrically neutral, and non-reactive till the ring is broken, while the open chains are amphoteric—basic by their terminal amino group and acid by their carboxyl. Gelatine can be digested by trypsin, but collagen is only attacked by pepsin, hence the view, supported by other facts, that collagen is the ring or anhydride form of gelatine into which it is converted by continued boiling or by the action of acids or alkalis.

### Elimination of Free Acid.

If gelatine (or hide fibre) be placed in dilute acid, it swells very much more than in water alone, and at the same time a considerable amount of free acid disappears (*i.e.*, is no longer capable of reddening methyl orange). The effect is most readily investigated with a strong monobasic acid such as hydrochloric acid. In this case the maximum swelling, which may reach an absorption of 50 cubic cm. of liquid for 1 gram. of dry gelatine, occurs at an acid concentration under 0.005 N, from which it rapidly falls in a curve of hyperbolic type as the concentration is increased, the equilibrium being completely reversible up to about 0.25 N, beyond which some secondary reaction, probably a further breaking up of the proteid chain, begins to take place. At the same time the total absorption of acid steadily increases with concentration in a curve which may be closely represented by the ordinary adsorption formula,  $a = kx^p$  (where  $a$  is total acid,  $x$  the concentration of external solution, and  $k$  and  $p$  are constants); but which is due to a complicated osmotic equilibrium.\*

Gelatine, being amphoteric, acts as a very weak alkali in presence of hydrochloric acid, and forms a gelatine chloride, which like most salts is highly ionised (in fact to practically the same extent as hydrochloric acid itself). The base, however, is very weak, its ionisation being of the same order as that of water, and consequently the salt is largely hydrolysed, and can only exist in the presence of free acid. Thus gelatine base, gelatine chloride, and free hydrochloric acid are necessarily present in such a jelly in proportions determined by the concentration of the acid, and instead of a definite point of neutrality such as is given by a strong base, we have only a curve approaching, but never reaching, complete neutralisation. This is the explanation of the apparent indefiniteness of proteid compounds, which has led many chemists to deny the existence of definite proteid salts.

### Causes of Swelling.

It has been stated that the swelling of gelatine in acids is due to a complicated osmotic equilibrium, and that it reaches a maximum at a very small acid concentration, and is repressed if the concentration is increased. A similar repression is caused by the addition of any salt with the same anion to the outer solution, and as neutral salts have no decomposing effect on gelatine, the repression can be carried much further than with acid; thus a chloride jelly treated with sodium or potassium chloride is reduced to a horny mass. Seeing that the jelly is almost as permeable as water both to ionised and unionised salts and acids, it is hard to see how this repressive osmotic pressure is exerted. The following is the explanation:

In equilibrium between a jelly and its external solution not only must all osmotic pressures be equally balanced, but, as has been shown by Donnan, the electro-chemical condition must be fulfilled that the products of the concentrations of any pair of diffusible anions and cations common to both phases

\* It may be well to point out here that the "adsorption formula" just quoted is absolutely void of theoretical basis, as regards adsorption, but is a mathematical expression which will closely represent any chemical or physical phenomenon which proceeds at a diminishing ratio. It is, for instance, the exact law of distribution of a solute between two immiscible solvents, in one of which its molecular complexity is  $p$  times that in the other.

\* From the Report on Colloid Chemistry by the British Association for the Advancement of Science.

† *Kolloidchem. Beihefte*, 1915, VII., 22.

must be equal. Thus with gelatine chloride and free acid the chloridions multiplied by the hydriions must be equal in the jelly and the external acid. On the other hand, the osmotic pressures depend not on the *products*, but simply on the *sum* of diffusible particles present. In the external acid the numbers of hydriions and chloridions are obviously equal, while in the jelly the chloridion of the gelatine chloride is added to the equal hydriion and chloridion concentrations of the free acid present, thus making the final concentrations of these ions in the jelly unequal. Now, as the sum of two unequal factors is always greater than that of two equals giving the same product, or, geometrically the perimeter of a square is always less than that of any other rectangle of equal area, and as the sides represent the osmotic pressure, while the area represents the product, it is clear that the two equalities cannot at once be completely fulfilled, but in electro-chemical equilibrium the osmotic pressure must be in excess and the jelly must tend to swell unlimitedly and finally to dissolve. That it does not do so is a consequence of its colloid nature, which depends on cohesive attractions drawing the colloid particles together to polymerised masses or to a continuous network, and which consequently opposes swelling and solution, while the diffusible ions are held to the colloid ions by electro-chemical attractions, and, as they cannot escape from the jelly, tend to drag it apart and dilute it by absorption of the external acid, from which they expel a part of its acid concentration. The equilibrium is therefore a very complex one, but finally depends on the excess of internal osmotic pressure being balanced against the internal attraction or cohesion of the colloid particles, both ions and molecules. It will be obvious that as the external solution becomes more concentrated the proportion of absorbed acid (or salts) is increased, while that of gelatine chloride is limited to the quantity of gelatine present. The difference of concentration of hydriion and chloridion in the jelly is therefore diminished, and it contracts under the influence of its own internal attractions. Precisely similar considerations apply to the action of alkalis on gelatine. Ionisable salts are formed by combination of the base with the carboxyl group of the proteid, and the osmotic equilibrium is with the cation and OH instead of with the anion and H.

#### Use of Stearic Acid

As has been explained, the leather-hide, freed from epidermis, consists of a sort of felt of fibres of gelatigenous tissue, which are themselves bundles of finer fibrils cemented together by some substance nearly identical with, but somewhat more soluble than that of the fibrils themselves. Treated with dilute alkalis or acids, this cementing substance is more or less completely dissolved, and the fibrils themselves are swollen. Accurate chemical investigation of skin is complicated by this fact of structure, for while the free acid or alkali absorbed in the jelly of the fibre is subject to the mathematical laws which have been explained, the interstices between the fibres are also filled with external solution by capillarity, and no accurate means has been found of measuring the proportion between the two. Hide swollen in acid or alkali is tense and firm, and containing its liquid in jelly-form in the fibres only parts with it under heavy pressure; but when the fibres are dehydrated by neutralisation, the skin becomes "fallen" or flaccid, and apparently much wetter, since the imbibed water is easily squeezed out. If in this condition the loose water is removed by soaking in alcohol or other dehydrating agents, the fibrils no longer adhere to each other, and a soft leather is produced, which, however, on again soaking in water, rapidly returns to its raw or "pelt" condition. If, however, a little stearic acid is dissolved in the alcohol so as to coat and partially waterproof the dehydrated fibrils, the leather at once becomes tolerably permanent. This led Knapp to the view that the process of tanning was merely an isolating and coating of the fibrils, and, though the explanation is incomplete, it unquestionably is part of the true one.

In order to make a soft leather, it is therefore necessary to have the skin in a flaccid or unswollen condition, and, assuming that it has been swollen by lime, this is brought about essentially by neutralisation.

In the ordinary processes of production of "alumed leathers" it is impossible to work without considerable addition of salt, and the process is largely a pickling one, the hydrolysed acid of the aluminium salt combining with the skin and leaving a basic salt which is also absorbed, the quantitative relation

between the two independent actions depending on the relative concentrations. If, instead of alum or normal aluminium sulphate, a basic alumina solution is used, salt can be reduced or dispensed with, and the tanning action depends less on pickling and more on the fixation of alumina. What has been said about alumina tannage applies with little variation to tannage with chrome and iron salts.

#### Fixation of Alumina

As regards the fixation of alumina and chrome, there is little doubt that in the first instance it takes place in the form of basic insoluble salts and is largely physical. The more basic a solution of these metals and the more readily and completely it is precipitated by the withdrawal of a further portion of acid, the more heavily it tans. If we imagine a normal salt to diffuse into the skin, and its acid to combine with the amino group of the proteid, then the remaining insoluble basic salt must remain precipitated in and on the hide fibre.

Vegetable tannage appears to be of a more colloidal or physical character than that with alum or chrome. Tannins, like the proteids, appear to form colloidal, rather than true ionic solutions, and the particles are negatively charged, going to the anode in electrophoresis. Whether the change is due to ionisation or to the fixation of an electrolyte ion is immaterial for our purpose. The gelatinous fibres, as we have seen, take a positive charge in acid, and a negative one in alkaline solutions. Hence in faintly acid solution, which produces the strongest positive charge, they attract and precipitate the tannin particles, while in alkaline solution no tannage takes place, and in those too strongly acid, the tannins themselves are precipitated.

#### Resistance to Hot Solutions

Besides the mineral and vegetable leathers there is a third class which demands consideration. If raw skins are filled with oxidisable oils, their water is gradually expelled and replaced by the oil, and if the skins are now allowed to oxidise (which they do with considerable liberation of heat and of acryl aldehyde and other volatile products), and are then freed from unfixed oil by pressing and subsequent washing with alkaline solutions, such leathers as "chamois," "wash-leather," "buckskin," and "buff-leather" are the result. Oil leathers, like chrome leathers, are very resistant to hot water, and also to hot soap or alkaline solutions, and may even be shrunk or "tucked" to increase their thickness and solidity by dipping in these liquids at boiling temperature. Their resistance to hot alkaline solutions, in which all oxidised oil products are soluble, proves that something more has occurred than a mere coating of the fibres with oils, but a full explanation has not yet been given. Since aldehydes are known to produce insoluble conjugated products with hide fibre, the explanation that acryl aldehyde (derived from the glycerine by dehydration) was the active agent was a plausible one, but is negated by the recent knowledge that equally good leathers can be made with the free fatty acids alone. This, however, does not altogether disprove the aldehyde theory, since the unsaturated oils which alone will chamois are apt on oxidation to break at a double linkage with the production of higher aldehydes. Another possibility is that these oils, which are more or less colloid, form emulsions of which the particles are electrically charged, and which combine with the fibre in the same way as the tannin particles may be supposed to do, though probably with an opposite charge.

#### Importance of Surface Tension

The oil squeezed out and known as *moellon* or *degras* is a natural emulsion, and finds wide use in leather-dressing for the "stuffing" of light leathers. This stuffing, the primary object of which is to lubricate the fibres and make the leather supple and water-resisting, may in many cases be also regarded as a supplementary and partial oil-tannage. The fats are applied to the moist leather either by hand as a pasty mixture of oils and harder fats, or in a melted state in a heated rotating drum. In the first method the main effect of the harder fats is to retain the mixture on the surface until the oils are absorbed. The water in the leather lowers the surface tension between oil and leather at the interface, and as the water dries out the oil replaces it by capillarity, leaving the harder fats outside. The surface tension of the various fats with regard to water and their consequent easy emulsification is thus of great practical importance.



## The Carbonisation of Lubricating Oils

By F. H. Garner

At a meeting of the Institution of Petroleum Technologists at the Royal Society of Arts on Tuesday evening, Dr. W. R. Ormandy read in *precis* a paper by Mr. F. H. Garner, of the Mellon Institution of Industrial Research, on the "Carbonisation of Lubricating Oils in Internal Combustion Engines." There was a large attendance and the President, Sir Frederick W. Black, K.C.B., was in the chair.

Dealing with the lubrication of internal-combustion engines, the author pointed out that the character of the oil used is mainly determined by the high temperatures produced in the cylinders by the combustion of the fuel and that it was essential that no decomposition of the oil which might interfere with the efficient operation of the engine should occur. Owing to the many factors influencing the behaviour of a lubricating oil it was found that the translation of these requirements into definite properties was not easy.

The nature of the oil used would depend on certain features of the engine, such as the method of cooling, speed of revolution and clearances, so that oils of different physical properties were demanded for various types of engines. Owing to the fact that certain qualities should be possessed by all such oils, tests other than those ordinarily made on oils for the lubrication of machinery operating at ordinary temperatures was necessary. The laboratory tests used for this purpose were the determination of the evaporation loss and of asphaltic matter produced by exposing the oils to high temperatures, and of the so-called coking value of the oil.

### Evaporation Loss

The evaporation loss at various temperatures must be connected in a definite manner with the range of distillation of the oil as determined in a partial vacuum or by means of super-heated steam; these properties of the oil and the flash point and fire test are all linked up with the vapour pressure of the oil at different temperatures. Other factors are also of importance, for the evaporation loss is dependent on the decomposition of the oil that occurs at high temperatures and on the content of non-volatile material, *i.e.*, of asphaltic resins and asphaltenes. The flash point of an oil is probably related to its initial boiling point, or at least to the distillation range of the initial fractions.

The amount of asphaltenes produced by exposing the oils to high temperatures, is usually determined simultaneously with the evaporation loss. The amount of carbonisation was shown by Holde to depend on the proportion of asphaltenes in the original oil; also, when an oil was treated with animal charcoal, the less highly coloured the oil produced the lower was the amount of asphaltenes formed from it at high temperatures. Thus the coloured constituents of oil, which can be removed by filtration through animal charcoal, may be regarded as an intermediate stage in the formation of asphaltenes; these asphaltic resins, isolated from petroleum by Holde and Eickmann by means of 70 per cent. alcohol, were found to be intermediate in physical constants, iodine value, and elementary composition to the purified hydrocarbon oil and asphalt.

### Coking Value

By the rapid vaporisation of an oil in the absence of air a residue of carbon is left, which is known as the coking value of the oil. The amount of carbon formed in this way is dependent, to a slight extent, on the rate of vaporisation, and the more slowly this is effected the higher the carbon content obtained; it is also dependent on the amount of asphaltenes present in the oil.

Since the process of vaporisation is also a cracking process, the higher the boiling point of the oil the greater is the decomposition, and, other conditions being the same, the higher is the coking value. In the internal-combustion engine all the processes described above take place owing to the wide range of temperatures present.

Dealing with the estimation of the asphaltic resin content of lubricating oils, the author states that the amount of asphaltene obtained depended on the solvent employed, pointing out that alcohol-ether gives greater values than petroleum ether; with regard to other solvents such as

butanone, amyl alcohol and ethyl acetate, many precautions had to be taken to obtain concordant results.

By extraction of lubricating oil fractions with 70 per cent. alcohol, a series of resins was obtained, of which the oxygen content, iodine number and viscosity, varied from those shown by refined hydrocarbon oil to those of asphalt. There exists, therefore, in unrefined petroleum fractions, a number of resinous or semi-asphaltic materials, which probably form the transition stage in the transformation of hydrocarbon oil to asphaltenes.

### Experimental Work

The extraction apparatus used in the author's experiments consisted of the usual Soxhlet form with all ground glass joints.

Extraction thimbles were filled with a weighed amount of a mixture of oil and animal charcoal of known composition; the thimbles were supported in the Soxhlet by means of a copper wire spiral, of which the uppermost ring lightly gripped the upper part of the thimble, so that the thimbles were raised about 2 cms. above the bottom of the extraction cup. It was found that by means of this device very efficient extraction was possible; at each emptying of the Soxhlet the liquid loosely retained by the material in the thimble was, to a great extent, drained away, and thus when further liquid condensed there was comparatively little contamination of this condensate with the previous extract.

For the first extractions petroleum ether of boiling point 40°C.-60°C. was used, and after the extraction had been carried on for the desired length of time the petroleum ether extract was transferred to a tarred flask and the Soxhlet flask washed out with petroleum ether. The combined extract was then evaporated at 100° to constant weight. From these figures the percentage of oil recovered was calculated.

After this series of extractions the thimble was heated in a hot air oven for a few minutes to evaporate the petroleum ether and then the extraction process was resumed as before, using chloroform, however, as solvent. In the preliminary experiments both fuller's earth and animal charcoal were used as absorbents for the oil. Some experiments were also made in which the oil was mixed with fuller's earth and placed in a small thimble, and this latter was then placed in a larger thimble and the intervening space filled with animal charcoal; such an arrangement gave very satisfactory results on extraction, but was discarded on account of the difficulties involved in duplicating the results with other animal charcoal and fuller's earth.

### Conradson Coke Test

The animal charcoal was about 15-20 mesh and was heated to redness in the absence of air prior to use; by blank experiments it was shown that benzene soluble and chloroform soluble material was not present in this charcoal.

In laboratory and engine tests conducted by the author the oils used were distillates from asphaltic base petroleum and stock-blended oil from paraffin and mixed base petroleum. Careful comparison of these tests would show that the distillates gave much more satisfactory service on all the engines than the blended oils.

The Conradson coke test was found to be a better criterion of the behaviour of the oil in the engine, as regards the formation of carbon deposits, than the carbonisation test. From results given in the engine tests on Liberty Aero Oil it appeared that in appraising the value of an oil from the Conradson coke determination, the value obtained from low specific gravity oils must be regarded as equivalent to a somewhat lower coke value for high specific gravity oils.

The most satisfactory oil tested (of 0.948 sp. gr. and 73 Viscosity (Saybolt) at 100°C.) gave a large amount of carbon which came out of the exhaust; incidentally, in connection with the recent work of Wells and Southcombe and others on the effects of small amounts of fatty acids on the lubricating qualities of oils, it is interesting to note that this oil had a high acidity. Oils of high acidity could not be used for the lubrication of aircraft engines, however, as the used oils were reclaimed by means of a water and soda ash treatment.

## Evaluation of White Pigments

### With Special Reference to Antimony Oxide

At the meeting of the Oil and Colour Chemists' Association, on Jan. 13, Mr. H. E. Clarke, of Newcastle-on-Tyne, read a paper on the Evaluation of White Pigments with Special Reference to Antimony Oxide. Dr. R. S. Morrell was in the chair.

The main purpose of the paper was to describe experiments made with antimony oxide as a pigment in comparison with white lead, although the general questions of fineness of subdivision, gloss, oil absorption and opacity were also dealt with. The fume in form in which antimony oxide is obtained in manufacture results from the oxidation of antimony oxide vapour, and thus differs in an interesting manner from zinc oxide, which may be regarded as a non-volatile solid produced by the burning of the vapour of zinc. The antimony oxide is collected in much the same manner as zinc oxide and appears as a snow-white or ivory powder which mixes very readily with oil and has obvious value, said Mr. Clarke, as a pigment. Antimony oxide made without due regard to pigment requirements, however, is a substance which has never obtained any real importance in paint and enamel manufacture. It is liable to marked and very irregular variation in spreading and hiding power as well as to fluctuations in colour. These objections, which have their origin in coarseness of crystalline texture and the presence of a yellow impurity, are claimed to have been overcome in an antimony oxide known by the trade name of Timonox, the red star brand being white in colour and green star brand a pale ivory. The specific gravity of Timonox is about 5.4, which is approximately that of zinc oxide. The two pigments, however, differ sharply in their behaviour with oil. Antimony oxide is very readily wetted, while its oil absorption is so much lower that good paste can be ground containing 10 per cent. of oil. It is said to be possible to prepare from such pigments oil paints with as much as 78 per cent. pigment, which flow well under the brush and give coats of great opacity and purity of colour. Antimony oxide has no accelerating effect on the drying of linseed oil such as is endowed by white lead, but a small proportion of driers overcomes this difficulty. Figures were given of the obliterating power of antimony oxide compared with lithopone A and B, zinc oxide and white lead. Taking lithopone A at 100, Timonox green star was found to be 85.4, and red star 77.6, white lead giving the poorest results at 57.6, the tests being made with equal masses. Results of tests of opacity showed greater capacity with antimonial paint.

Summing up, the author claimed that it had been established that in antimony oxide we have a pigment with a wide field of usefulness which only time can properly explore. Its stability admitted of its use in all but the most extreme industrial conditions—conditions under which the other regular white pigments failed. The order of its success depended largely upon the goodwill and co-operation of the chemists and all branches of the oil and colour industries. Much of the old prejudice against the use of antimony oxide had disappeared in the light of scientific truth and increasing knowledge, with the result that fabulous claims could no longer be sustained.

### Discussion

The PRESIDENT said that what interested him in particular was the durability of oxide of antimony for outside work, because it would seem that the great rival to Timonox was lithopone, and was the author quite certain that Timonox had actually beaten lithopone? Personally, he believed that for external work it had beaten lithopone, because everybody admitted that lithopone was no good. There was a tendency for Timonox to soften out of doors, and that that was being overcome by mixing it with a basic pigment, and was he to understand that this meant some inter-action between the acid oxide and the basic oxide? It seemed to him that in Timonox they were introducing an entirely different and new form of pigment, which was essentially an acidic pigment, and he would like to know what the effect of that acidic pigment would be on the properties of the linoline formed on the oxidation of the oil. Would  $Sb_2O_3$  exercise any reducing properties on the linoline, because  $Sb_2O_3$  very easily transformed into  $Sb_2O_2$ ? Therefore, if  $Sb_2O_3$  were mixed with the oxidised linseed oil, would it reduce the oxidised linseed oil and de-linoline it? If it did so, that might account for the slight softening action of the  $Sb_2O_3$ . He also would

like to know how Timonox behaved in the matter of enamels, and how it compared in feeding up properties with lithopone? In the paper it was only compared with zinc oxide and not with lithopone.

Mr. CLARKE said that the durability of Timonox against lithopone was altogether in favour of Timonox for outside work. For the purposes of inside work, however, he did not suppose there would be very much to choose between them. As a matter of fact, it was not desired to bring forward antimony oxide in violent competition with any pigment, but merely that it should find its proper place. It was an interesting fact that antimony oxide was an acidic pigment, but the acidity was more a question of sulphuric acid, and it might be that the hardening action of the zinc was due to the movement of that sulphuric acid.

Mr. W. J. PALMER said that although antimony pigments had been known in a general sense to the trade for some years, they had all fought shy of them because, in the past, going back 12 years ago, such things as antimonial whites made their appearance on the market for a year or two and then died a natural death. Two years ago, however, they reappeared on the market, and it was at once seen that there had been a marked improvement. He would like to know how antimony white pigments would re-act with wood oil varnishes and resin varnishes. It was known that zinc oxide and even lithopone, with a low content of zinc oxide, in the case of certain good oil varnishes, would lather up and become thick in a comparatively short time.

The AUTHOR said that the question of flattening was an interesting one, and might possibly be due to the hydrolysis of an antimony salt or antimony sulphate, which would mean in effect an increase in the number of pigment particles and consequently a flatness, because the particles would not have their proper quantity of oil.

Mr. R. P. L. BRITTON said that the pigments made with antimony oxide yellowed rather readily under the influence of sulphuric acid, and he wondered if that was due in any way to its conversion to  $Sb_2O_2$ . With regard to feeding as compared with lithopone, he had done some work in this connection and had been struck by the remarkable inertness of antimony oxide. In no case that he had tested had it shown any tendency to feed, whereas lithopone had been most readily attacked.

Mr. DUNSTER, speaking with regard to antimonial poisoning, asked if there was any reason for this, and what was the antidote for it. He also asked whether it was claimed for this pigment that it was superior to white lead for outside work, say, in London, Leeds or similar places, where the atmosphere was bad. It was during the war that antimony oxide was found to possess very useful properties, particularly with fatty acid mediums, and it might be said that antimony oxide did not feed up to any great extent in varnish mediums.

A SPEAKER asked how antimony oxide would stand the sulphur vapours of vulcanisation in the rubber industry. The AUTHOR said he did not think it would stand these conditions.

Mr. H. A. CARWOOD (hon. sec.) asked if the author could explain why a particular consignment of antimony oxide sent abroad was found to be grey when opened out, and not white.

The AUTHOR said he thought this was an argument for mixing a certain proportion of zinc oxide in the antimony oxide. There had, however, been a great improvement in colour, because, at the time Mr. Carwood spoke of, namely, 1916, the technology of the thing was in a very primitive condition.

Mr. CARWOOD said that antimony oxide and other oxides behaved exceptionally well in acid mediums.

Mr. HAINES said that from the printing ink point of view he could not say that antimony oxide was an ideal pigment, because he regarded an ideal pigment as one which should behave as it ought to under all circumstances.

Mr. TYSON, who also spoke from the printing ink point of view, said that the thing which had appealed to him about antimony oxide was the exceptionally fine state of the particles. It ground very easily, and was remarkably white compared with lead.

A SPEAKER inquired as to the durability of antimony oxide on iron and steel.

The AUTHOR said that the tests he had made on iron and steel were really the first comparative tests against other white pigments, and they showed antimony oxide to stand remarkably well.

## Chemical Ceramics

By J. W. Mellor, D.Sc.

A LECTURE on chemical ceramics was delivered at the Manchester College of Technology on January 13, by Dr. J. W. Mellor, of the Central School of Science and Technology, Stoke-upon-Trent.

Dr. MELLOR said that there was an intimate relation between the development of the metallurgical and chemical industries and the progress of the ceramic industries. Every improvement in the fire-resisting qualities of the materials used in furnace construction was attended by a corresponding advance in output and yields; also in chemical industries where corrosive gases and liquids had to be handled the success of a process was often dependent on an improvement in the resistance to attack offered by the containing vessels. He confined his attention to the types used mainly in chemical engineering.

### Porcelain, Stoneware and Earthenware

The main types of chemical pottery were porcelain, stoneware and earthenware. The two former usually had vitreous bodies. Porcelain was translucent in moderately thick layers; earthenware and stoneware were not translucent except possibly in thin layers. There was no hard and fast line of demarcation between these different types.

It was rather curious that immediately after the Great War had started it was realised that another British industry had almost left these shores for Germany. So far as he could gather the manufacture of what was now understood as chemical stoneware originated with the Lambeth potters early in the nineteenth century, though, of course, stoneware was used in chemical operations long before that. The so-called chemical porcelain was more truly a German product, and before the War it had not been seriously manufactured in this country. Consequently, during the earlier period of the war chemists had to make shift with adaptations of British types of pottery.

The chemical engineer should have some knowledge of the processes of manufacturing chemical pottery in order that apparatus might be designed to get the best out of the material.

### Manufacture

The raw material for typical pottery bodies was clay, felspar, and quartz; for porcelain, these constituents were approximately in the proportions 2 : 1 : 1. The raw materials were not pure, and each might contain a larger or smaller proportion of the other two. Natural clays might contain more or less of all three constituents, and also usually contained some colouring oxide, generally ferric oxide. In any case, the mixture was moulded to a desired shape, dried, and fired to form the "biscuit." During the biscuit-firing some of the constituents began to fuse, binding or cementing the other constituents together. The molten fluxes, generally feldspathic, dissolved some of the less fusible constituents, quartz and clay, and when the action had progressed far enough the reaction was stopped by cooling the kiln. The body then largely contained more or less undissolved clay and quartz embedded in a glassy vitreous matrix.

The biscuit body was glazed by a spreading fusible mixture over the body, and refiring the whole in the so-called "ghost oven" at a lower temperature than the biscuit oven. The biscuit was then covered by a glassy film or glaze. There were many modifications; for example, biscuit and glazed materials could be fired in one operation, as was usual with hard porcelain, or the biscuit body might be salt-glazed. This was effected by introducing salt into the biscuit oven near the finishing stage. The salt decrepitated and vaporised, and finally reacted with the surface of the body, forming a vitreous glaze.

### Drying and Firing

Dr. Mellor then explained that there was a contraction or shrinkage during the drying of the moulded article of about 6 per cent., and nearly as much more in the firing, thus introducing an element of uncertainty in the result, and making it impossible to control the exact size of the finished ware. It was, therefore, necessary to grind certain parts, such as taps, acid-pumps, tubulures, joints, &c. If the drying took place irregularly the piece might develop cracks. The bases of large pieces gave trouble in drying, because the great weight had a tendency to prevent the mass from contracting at the bottom, and in that case drying cracks were sure to develop. In the

early days of the war, some firms were unable to manufacture large pieces because they were unable to overcome the difficulties involved in drying the flat bottoms. These difficulties were the concern of the potter, but chemical engineers could help in designing large vessels with no unnecessary width to the base.

### Chemical Stoneware Requirements

Among the more important qualities expected from chemical stoneware were resistance to reagents, resistance to sudden change of temperature, and high tensile strength or bursting pressure.

Pottery could not resist the action of hydrofluoric acid, but it could be made to resist the three mineral acids. The vitreous types of pottery best resisted the action of acids; the porous bodies were not suited for the purpose because of absorption and seepage. Glazing, of course, protected porous bodies from absorption, but even then such bodies were not suitable because the glaze might in time crack or peel or have pinholes which permitted liquors to pass to the body. There was no particular advantage in glazing good vitreous bodies so far as permeability to liquids was concerned, and there was a positive disadvantage in glazing ware intended to withstand abrupt temperature changes. A glaze improved the appearance of the ware and enabled precipitates and crystals to be more readily removed.

### Mechanical Strength

The mechanical strength of pottery was low when contrasted with that of the metals; but it was still sufficient for many purposes. In many cases where there was a large interior pressure, as in acid eggs, &c., it might be necessary to strengthen large vessels by bands and jackets, especially when it was possible to do so without interfering overmuch with the required expansion of the vessel. It was not always practicable to increase the thickness proportionally with the size of the vessel, so that the permissible internal pressure decreased with increasing diameter. H. Nielsen and J. R. Garrow had calculated the thickness of the walls of conduit pipes necessary to withstand different bursting pressures on the assumption that the ultimate tensile strength of pottery was 600 lb. per square inch. They had also made out a strong case for the standardisation of the dimensions of pipes, jars, &c., required as general apparatus in chemical plant, thus ensuring interchangeability of the products of different manufactures and simplifying the work of the chemical engineer.

## "Two Hopeful Signs"

To the Editor of THE CHEMICAL AGE.

SIR,—I was interested in your article, "Two Hopeful Signs"—especially referring to chemists in the last paragraph. I agree that there are more openings abroad for professional men than in this country, and these no doubt are for single men with ages between 30 and 35. My dilemma is, that being disbanded at the Armistice of 1918, I have failed still to hear of an opening for men over 45 years of age and married, in spite of being on the books this length of time of the Ministry of Labour Appointments Board, Federation of British Industries (Employment Bureau) and Institute of Chemistry Register. My outlook after 24 years' experience is anything but hopeful, although I should have liked to have been in a position to retire in 1918, but nothing in these days could be saved from £4 a week. Yours, &c.,

TECHNICAL CHEMIST.

For injury resulting in the loss of the sight of an eye through the EXPLOSION OF A TEST TUBE at a chemistry class in Ringsend Technical School, Wm. Beattie, aged 16, years, obtained £250 from the Pembroke U.D.C. in settlement of an action for damages, together with £45 towards costs. Mr. Justice Samuels made the consent a rule of court.

A curious sight was witnessed at Swansea docks a few days ago. In one part BLENDE ORE from the Montgomeryshire mines was being shipped to Antwerp to be smelted, and returned to Swansea in the form of spelter plates and discharged almost under the smokeless chimneys of the Welsh spelter works, shut down owing to losses on production. Pig iron from Caen, produced from ore worked at the Normandy mines, was elsewhere being unloaded to be turned into steel at Swansea, and, as likely as not, to find its way back to France as Welsh tin-plates.



## Lead and Antimony Industries on Tyneside

THE growth and history of almost all the main industries of the country are closely associated with particular areas or towns. It is impossible to think of steel without thinking of Sheffield, or of cotton without its mother city of Manchester. The beginnings of the industries of Great Britain were remarkably similar to one another, and the lead and antimony industry is no exception to the general rule.

Many of the properties of lead were known to the Ancients, and Roman cisterns made of lead of remarkable purity are not uncommon. The ores used were extremely rich in lead, and their actual smelting presented little difficulty. Ores mined to-day, however, contain a much lower percentage of lead, and many more impurities, and their smelting and purification demand the application of highly scientific principles. The history of the lead and antimony industry in this country is closely allied with the history of Messrs. Cookson & Co., Ltd., who, established in 1704 on Tyneside, gradually developed with the growth of the industry, adopting discoveries that science placed at their disposal to improve processes which had been in operation for generations. To-day, in spite of the accumulated experience of 217 years, they are continuing research on the most modern lines, and just as the name of Bessemer is associated with steel, so the name of Cookson is with lead, antimony, and their products.

A visit to either of Messrs. Cookson's lead and antimony works is an education. It is impressive to see the great furnaces, some of them holding up to 350 tons of molten metal, and to watch the lead poured out like water, some into moulds to make the well-known Cookson's pig, some into blocks of 10 tons to be rolled into sheet or pressed into pipes.

### Chemical Lead

Many of the processes adopted, and the improvements evolved, are trade secrets, and possibly the one that is most generally sought after in the lead industry is that by which Cookson's chemical lead is made. Lead for chemical purposes must be of a high purity, and Cooksons are able to guarantee that their chemical lead is 99.99 per cent. pure. It is a considerable achievement to produce anything on a commercial scale with this high degree of purity, and this is particularly so in the case of lead which contains so many impurities which it is difficult to remove.

Much of the pig lead produced is used in turn for the production of white lead, red lead, orange lead, and litharge. The refining of their own metal gives the firm a great advantage, as they can thus manufacture exactly the right type of lead for the successive processes. Like their lead, Cookson's lead products are very well-known. White lead, both dry and ground in oil, for pigmentary purposes, is turned out by thousands of tons per annum. Red leads manufactured by special processes for every purpose for which red lead is used are finding increasing sales, and the glass and accumulator industries who were inclined to look to Germany for their supplies for specific qualities of this material are turning to Cooksons in increasing numbers. Orange lead, which was almost exclusively produced by Germany, is now manufactured of a quality superior to the pre-war German material. Of litharge alone Messrs. Cookson & Co. produced, during the first nine months of 1920, more than four times the combined output of the years 1910, 1911, 1912 and 1913. Incidentally it is interesting to recall that Cooksons alone, of all British manufacturers, were able to produce litharge to comply with the stringent specifications demanded by the R.N.A.S. during the war.

As is the case with the lead industry, Cooksons are mainly responsible for the fine antimony industry in this country, being the only firm who smelt and refine antimony on Tyneside.

They are owners and controllers of mines in Mexico, China, and England, and can therefore maintain the quality of their output. Their "C" Brand Antimony, which carries a guarantee of 99.6 per cent. purity, is universally recognised as the world's standard antimony.

Combined with this is the production of golden sulphide of antimony, a chemical largely used in the rubber industry, and which has only recently been manufactured in this country. In addition, another antimony product, which is manufactured by a new and secret process, has recently been placed on the market

under the name of Timonox. This pigment, judging by reports received from manufacturers of paints and enamels, and from the repeat orders that are already being received, has high possibilities. It has remarkable covering power and durability under all conditions, and has the additional advantage of being non-poisonous. As smelters of both lead and antimony of high degrees of purity, Cooksons are in a favourable position to produce type metals and other alloys, the composition of which in every case they guarantee. These successful enterprises are due to the application of scientific principles to an ancient industry, to the manufacture of well-equipped works on up-to-date lines, and the employment of a large staff of chemists and metallurgists.

## Society of Chemical Industry

### Lecture on Colloids

THE first of the series of lectures arranged by the Newcastle Section of the Society of Chemical Industry on "Colloids" by Mr. Emil Hatschek, F.I.P., A.M.I.M.E., was a very great success, over 200 members being present despite the greatest rainstorm which has occurred in the district for seven years.

Dr. J. H. Paterson presided and very briefly introduced the lecturer.

Mr. Hatschek succeeded in maintaining the greatest interest of his audience throughout the meeting, the experiments being followed with the greatest possible attention.

The lecturer prefaced his remarks by explaining that there was really no such thing as a colloid, though all substances were capable of being brought into what was known as the colloidal condition. In dealing with colloids it was only necessary to define what was meant by the colloidal condition in order to embrace all the phenomena dealt with under that heading. To bring material into the colloidal condition it was necessary to convert it into particles of extremely minute dimensions—particles of three to five millionths of a millimetre being quite common. In that condition the physical properties exhibited by the material were largely those which were connected with surfaces, as, owing to the huge surface exposed by such minute particles, those phenomena overshadowed all others. The lecturer then demonstrated the preparation of colloidal gold by the reduction of gold chloride with dextrin and of copper ferrocyanide from copper sulphate and potassium ferrocyanide.

An experiment was shown in which the movement of colloidal carbon and a colloidal dye (night blue) was seen under the influence of electric current and the probable origin of the electric charges carried by colloidal particles explained.

The coagulating effect of electrolytes on colloid suspensions was dealt with and the effect of the valency of the precipitating ion was demonstrated by adding solutions of common salt, calcium chloride and aluminium chloride to copper ferrocyanide suspension, showing that as the valency of the precipitating ion increased a very much more dilute solution was necessary to cause coagulation in a given time.

The ultra microscopic appearance of suspended colloidal particles was dealt with, and the Brownian movement was demonstrated by viewing cigarette smoke suspended in air under a special microscope.

### Edinburgh and East of Scotland Section

THE monthly meeting of the Edinburgh and East of Scotland Section of the Society of Chemical Industry was held in the hall of the Pharmaceutical Society of Great Britain, 36, York Place, Edinburgh, on Tuesday evening, Mr. J. R. Hill, presiding.

On the motion of the Chairman, it was resolved to send the congratulations of the Society to Sir James Walker, Professor of Chemistry in the University of Edinburgh, on the honour that has been conferred upon him.

Mr. HARRINGTON, on behalf of Dr. George Barger, Professor of Chemistry in Relation to Medicine in the University of Edinburgh, who was unable to be present, exhibited and gave a demonstration of an apparatus employed in the micro (Dumas) nitrogen method. He explained that with this method a very small quantity of the substance sufficed, and the whole process could be completed in half an hour. The important

principle in the apparatus was the micro-balance which enabled accurate weighings to be made to the 100th part of a milligramme. The process could be carried on with one or two milligrammes. The material used was usually about 5 milligrammes' weight. Great care must be taken to exclude air. CO<sub>2</sub> was obtained by heating sodium bi-carbonate. The gas from the combustion was passed through a 50 per cent. KOH solution, and collected in a separate tube and the volume ascertained. In the discussion which followed the question was raised as to whether the micro balance required special protection from draughts of air or variations in temperature, and it was explained that the balance was placed on a shelf in a part of the laboratory where it was free from air currents and also from one-sided heating. In reply to a question, it was explained that the weight was weight in air and not weight in vacuo. There was always a correction of about 2 per cent. viscosity or surface tension. In the case of a substance burning with explosive violence it was suggested that this could be overcome by mixing the substance with some inert body such as sand. The apparatus worked very easily with substances which were not too difficult to burn; but when the substance was not easily burned it was necessary to mix the substance with copper oxide. The results obtained gave a very high accuracy—for example, in the case of acetonated wire the calculated percentage of nitrogen was 10.4, but the accurate estimation gave 10.44 per cent.

Mr. B. D. W. LUFF explained a new device for use in titration to prevent overstepping the end point; and Mr. T. May exhibited a safety device for carious tubes.

Mr. W. T. H. WILLIAMSON gave a demonstration of the Dronic water tester. He described the principle of the instrument, and stated some of the purposes to which it could be put. A chemical analysis of the water having once been made the conductivity of the instrument would indicate any variation in the hardness of the water. Among other uses to which it could be put were the determination of the purity of distilled water, the detection of leakage into a surface condenser in steam raising and the detection of sewage pollution in rivers.

Mr. WILLIAMSON communicated some notes on "Tests for Soil Acidity." He gave a short resumé of the present position of the theory of soil acidity, and indicated the present methods for determining the amount of acidity. He then demonstrated the Truog's test, which is a rapid method of detecting soil acidity, and its possible collective application of being sufficiently accurate for field purposes. He also showed a test recently investigated by Comper, which depends on the production of a red colour upon the acid soil if shaken with a solution of potassium thiocyanide. This test seemed to be quite reliable for indicating the presence of acid in the soil, but no quantitative interpretation could be put on the intensity of colour. He had tested typical soils by this method, and compared the results with those obtained by the standard Hutchinson-Mackennan method.

## Big German Dye Case Resumed

### The Supply of Paranitraniline

IN the Chancery Division on Monday, before Mr. Justice Russell, the hearing was resumed of the case (adjourned from December 16), in which summonses relating to contracts for the supply of dyes by companies whose businesses were ordered to be wound up during the war were further heard.

The claimants in the actions were the Bradford Dyers' Association, the Calico Printers' Association, Ltd., the United Turkey Red Company, Glasgow, the British Cotton & Wool Dyers' Association, Ltd., the Indigo Buying Amalgamation, Messrs. F. Scott & Co., Ltd., and the executors of Thomas Welch, who sued for damages for the non-delivery of German dyes under contracts made before the war. The defendants were the controllers of the following English registered companies:—The Bayer Co., Ltd., the Badische Co., Ltd., the Berlin Aniline Co., Ltd., Kalle & Co., Ltd., Greisheim Elektron, Ltd., and Meister, Lucius & Bruning, Ltd.

On Monday the Court first investigated two contracts for the supply of paranitraniline and aniline oil which were made between the Calico Printers' Association, Ltd., and the Greisheim Elektron, Ltd.

Mr. Cyril Atkinson, K.C., for the Controller of the Greisheim Elektron, Ltd., said he did not think it would be contested that if it were possible for a company to be registered in this country and yet be an enemy company, this must be that case. Until September, 1912, the Chemische Fabrik Greisheim Elektron, of Frankfort-on-Main, were represented in this country by a firm named Kenyon, who were the agents for Lancashire. But on the 27th of that month the Greisheim Elektron, Ltd., was incorporated in this country with a capital of £5,000 in £1 shares. There were ten shareholders, of whom seven were Germans resident in Germany, holding 4,979 shares, and three directors, also Germans, living there. None of the shareholders paid for their shares. The head office of the newly-incorporated company was at Frankfort, and the Manchester office was called the Manchester branch.

From the outset letters came from Germany containing the most minute directions as to how the business should be carried on, and the Manchester office could not even engage an office boy without first getting permission from Frankfort. History showed that the Manchester branch was completely controlled from Germany, that the Greisheim Elektron, Ltd., was admittedly the servant of the Chemische Fabrik.

One of the contracts under discussion was for aniline oil, and was expressed to be between the Calico Printers' Association and the Greisheim Elektron, Ltd., acting on behalf of the Aniline Convention. Under this contract 22,648 lb. were delivered from stocks in this country after war broke out. But with regard to this contract counsel submitted that the company were not a party, as they merely acted on behalf of the members of the Convention.

His Lordship inquired if the Greisheim Elektron, Ltd., had ever declared a dividend.

Mr. Devonshire (with Mr. Atkinson, for the Controller) said a dividend was declared after the outbreak of war by the direction of the Board of Trade, but that none had ever been declared before that. He added that, for all practical purposes, all the directors' meetings were held at Frankfort.

### British Cotton and Wool Dyers' Claim

The claims of the British Cotton & Wool Dyers Association, Ltd., for damages in respect of the non-delivery of 30 tons of assorted colours and 10 tons of naphthaline direct black by Kalle & Co., Ltd., were next dealt with.

Mr. Langden, K.C., said his chief grounds of objection to the claims were that the contracts were dissolved by the war, that Kalle & Co., Ltd., were enemies, and that there had been no anticipatory breach. The German firm of Kalle had their works at Biebrecht-on-Rhine, and Kalle & Co., Ltd., had its head office at John Dalton Street, Manchester, with a branch office at Bradford. With the exception of two, all the shares of the English company, which was formed in 1908, were held by Germans, and the active direction of the business was from Germany, where the directors met and issued their instructions.

Counsel read an agreement of service and correspondence with the object of showing that officials at Manchester were the servants of the German firm. As to the course of business he said it was this: An order would be taken by the English company in form, and the English company would receive from Germany from time to time to meet the probable requirements of their big customers over a certain time, getting their stocks increased according to the demand. Formal invoices were sent by the German firm to the English company in respect of all the stock consigned to England, but no terms of payment were specified, no actual dates of payment were required, but the satisfaction of the prices of the goods would be met by the remittance of lump sums. Lists of daily sales were sent to Germany, the prices at which the goods were to be invoiced by the English company were fixed in Germany. Duplicate sets of books were kept in Germany, monthly trial balances were sent there, also a copy of the ledger accounts was regularly sent to England to keep the financial relations between the two concerns correct. All questions of credit were invariably determined in Germany, and instructions were given as to how the English company was to proceed in relation to overdue accounts. In fact the German firm had almost a photographic reproduction in Germany of the business done in this country.

The hearing was adjourned.

## Export of British Dyestuffs

### Important Relaxation of Restrictions

The Chemical and Dyestuff Traders' Association announces that it has received from the Board of Trade the following official notification as to important relaxations of the present restrictions on the export of dyestuffs:—

"The Licensing Section of the Board of Trade are now prepared to grant export licenses for reasonable quantities of practically all dyestuffs and intermediates, except benzol, to firms who have the material actually in stock, without requiring a manufacturer's certificate. Applications for such licences should be sent in direct to the Licensing Section of the Board of Trade, Great George Street, S.W.1."

At a meeting of the Executive Council held in London, on Tuesday, resolutions were unanimously passed, stating that the council viewed with grave apprehension indications that the position of merchants with regard to both imports and exports is being prejudiced by continued exclusions and restrictions, instead of being encouraged as a vital element in the restoration of overseas trading, and that this council were not satisfied that there would be any necessity for increased charges for the use of the telephone if the system were worked upon sound business principles, and strongly protested against new and greatly increased charges being suddenly imposed without full and proper investigation or consultation with the interests most affected and without Parliamentary approval and sanction.]

## James Watt & Son, Ltd.

### Voluntary Liquidation

A MEETING of creditors of James Watt & Son, Ltd., shippers and dealers in turpentine, resin, &c., was held on January 17 at Winchester House, Old Broad Street, E.C. The chair was occupied by Mr. G. S. Pitt, one of the liquidators of the company. The shareholders had previously passed the usual resolution in favour of voluntary liquidation, and had appointed Mr. Harold Platford and Mr. G. S. Pitt to act as liquidators.

The chairman read figures which showed that the ranking liabilities of the company amounted to £253,131. Of that amount £146,688 was due to unsecured creditors, while there were partly secured creditors whose claims aggregated £344,158. The partly secured creditors were principally the banks, and the securities they held consisted of stocks of the estimated value of £237,715, thus leaving them as unsecured creditors for the balance of £106,443. The free assets of the company were estimated to realise £99,052, and the figures thus showed an approximate dividend of about 7s. 9d. in the £, subject to realisation. The assets comprised: stock-in-trade, £3,500; furniture and fittings, £200; investments, £5; and book debts, £142,733, expected to produce £95,722. The chairman said that, for the purposes of valuing the security held by the secured creditors, turpentine had been taken in at 90, resin at 20, paraffin wax at 5½d. per lb., fine oil at 120, and wood oil at 75. With regard to turpentine, practically the whole of the company's stock had been sold, and in the event of their being able to acquire any turpentine at a lower price than 90, it would mean an increased profit to the estate.

Questions were asked with reference to the large debt owing by a French customer, and the chairman said he understood it was a perfectly good account. He believed it was true that the customer in question was due to take up turpentine in December, but failed to do so. All turpentine accounts had been closed at 90.

Mr. Platford said he was informed that the French customer told the company to sell the turpentine, but, owing to the market in December, they could not do so.

A resolution was unanimously passed confirming the voluntary liquidation of the company with the liquidators appointed by the shareholders, and it was pointed out that Mr. Pitt and Mr. Platford had been appointed as liquidators at the express wish of the creditors.

Bolton Corporation have passed plans for the RE-CONSTRUCTION OF AN ENGINEERING SHOP for the Bleachers' Association Ltd.

## Losses on Anthracene Contract

A sitting for the public examination of Ricardo (or Richard) MODERN, commission agent, 31, Tregunter Road, South Kensington, was held on January 14th at the London Bankruptcy Court. A statement of his affairs showed gross liabilities £2,023 6s. 8d., expected to rank for £968 15s. 4d., against assets valued at £950 8s. 8d.

In answer to the Official Receiver, the debtor said that in September, 1919, he promoted the Anglo-Argentine Export and Import Company (Ltd.), to trade as merchants, shippers and brokers. In June, 1920, he went to Germany to complete a contract entered into by the Company for the purchase of 53 tons of anthracene, an intermediate used in the manufacture of dyes. He borrowed £200 from a Mrs. Winter, on terms that she should have half the profits on the contract. The anthracene was sold to him at 95 per cent. strength guaranteed, but on analysis the strength was shown at 85 per cent. and his deal fell through. Mrs. Winter brought an action for the recovery of her money which he did not defend and she obtained judgment against him.

The debtor attributes his present position to the failure of the company, the slump in trade, the high cost of living and loss on the anthracene deal.

The Registrar remarked that he thought the debtor's furniture and house would provide enough to pay all debts in full.

The examination was concluded.

## Glass Manager's Claim

AT Newport County Court, on January 13th, before Judge Hill Kelly, John Adamson claimed £100 damages against the South Wales Glass Manufacturing Company, Ltd., for wrongful dismissal. Mr. F. H. Dauncey, for the plaintiff, said that in May, 1917, plaintiff was appointed works manager by the defendants at a salary of £300 per annum, subsequently increased to £450, with house, coal and gas. The agreement vested in him the entire control of the works and employees, and the engagement was terminable by three months' notice on either side. Three years after his appointment a new company was formed, and it was stated in their prospectus that they had acquired the staff and management of the old company. Plaintiff was informed by the directors that they were going to transfer a certain amount of his work to the commercial manager's department. Plaintiff said he could not accept those conditions.

For the Defendants, Mr. William Evans, chairman of directors, and Mr. Frank Dilworth Armstrong, said that the commercial department was more in touch with the company's customers.

His Honour held there had been a breach of agreement by the decision to bring about a change under which plaintiff would not retain the amount of control stipulated in the agreement, and gave judgment for plaintiff for the amount claimed.

## Trade Journals at Olympia

At the forthcoming Efficiency Exhibition to be held at Olympia from February 10 to 26 inclusive, Benn Brothers, Ltd., have secured a prominent position in the main gallery (just above the main entrance) and have arranged for an attractive display of their numerous trade and technical journals, trade directories, and diaries; their numerous scientific, technical and commercial books will also be included. Representatives will be in constant attendance ready to deal with all enquiries concerning the firm's publications, and advise and help visitors on trade matters covered by the Benn organisation. Our readers are specially invited to call at the stand when visiting the show.

The following APPOINTMENTS TO THE ORDER OF THE BRITISH EMPIRE, for services in connection with the war, have been announced: O.B.E. (Civil Division)—Major Sir D. Mawson, D.Sc., head of Explosive and Chemical Section, Foreign Trade Department; Mr. W. H. W. Lacey, Manager, Checekan Oilfields, Baku. N.B.E. (Civil Division)—Mr. S. R. Price, H.M. Contracts Section, Explosives Supply Department, Ministry of Munitions.



## From Week to Week

AN EXPLOSION OF BENZINE set fire to a train on The Petrograd-Pskoff railway. No fewer than 68 deaths are reported.

A fifteenth century chapel at Lapford, Devon, is at present being utilised as a FERTILISER STORE.

IMPORTS OF RUBBER during 1920 amounted to 103,095 tons. The amount recorded for 1919 was 85,816 tons.

The police have made several arrests in connection with a case of alleged incendiarism at the premises of the VACUUM OIL CO., LTD., Wandsworth.

According to Lloyd's, the s.s. "Carmelita," laden with 492 CASES OF PETROLEUM, took fire at Puerto Cabello on the 16th inst. and became a total loss.

An agreement has been entered into between France and Denmark whereby France will SUPPLY DENMARK WITH POTASH in return for agricultural products.

It is proposed to establish a SUGAR INDUSTRY in the Kenya Colony, Mauritius, and a factory will shortly be erected there.

Exports of PULP AND PAPER from Canada during 1920 exceeded the previous year's exports by nearly 100 per cent.

It is reported that American interests have approached the Ontario Government with a view to the participation in a new process for the MANUFACTURE OF NICKEL STEEL.

It is reported from Moscow that a method of WORKING A PARAFFIN MOTOR WITH NAPHTHA has been invented by an employé of the Moscow-Kursk Railway.

GERMAN DYES are arriving in Japan, under the reparations provisions of the Peace Treaty, and the Government is to appoint a committee to decide the disposition of the dyes.

Plans have been approved by the Heston and Isleworth U.D.C. for a boiler-house and chimney shaft at the ISLEWORTH PREMISES OF LEVER BROTHERS, LTD.

The question of the establishment at Zanzibar of distilleries for the manufacture of CLOVE OIL ESSENCE is receiving a great deal of attention, but nothing has as yet been settled.

TASMANIAN FULLER'S-EARTH on analysis compared very favourably with the English and American products. As there is a shortage of this material in Australia it is probable that a new industry will be established.

The death occurred on December 19th, at Columbia, South America, of CAPTAIN JOHN WILKIE, who was connected with the Imperial Oil Co., Ltd., and the International Petroleum Co., of Toronto.

The newly inaugurated BRITISH BALTIC ASSOCIATION has for its object the reviving of pre-war trade with the Baltic and, incidentally, of cheapening paper, linseed, cellulose and other commodities.

During the past year the Appointments Board for Wales state that it has been the means of finding 379 appointments including highly technical posts such as RESEARCH CHEMISTS AND METALLURGISTS.

The temporary closing from January 29 of MESSRS. JOHN LYSAGHT'S WORKS at Bristol is confined to the export department, carried on at St. Vincent's Ironworks. One thousand workmen will be affected.

The production of HEMATITE PIG IRON in North Lancashire has been cut down still further by the putting out of a furnace at the Ulverston Ironworks and the damping down of another, the whole of the works now being idle.

Large crushing works have been erected in Auckland in anticipation of supplies of PHOSPHATES FROM NAURU, the ex-German island, for which a joint mandate was granted to Great Britain, Australia, and New Zealand under the Peace Treaty.

While cycling Mr. Richard Bryant, assistant works manager at the BRITON FERRY CHEMICAL WORKS, was attacked by a dog and bitten on the thigh. The Neath magistrates, holding the dog was dangerous and not under proper control, ordered its destruction.

Under the auspices of the Bergisch-Maerkische Industrie Gesellschaft of Barmen, a new COAL TAR PRODUCTS company has been established at Erwill, Westphalia, with an initial

capital of two million marks. The company will be known as the Alfred Ott A.G.

It is reported that the scheme of the Japanese colour makers, to effect a combination of all the SULPHUR BLACK DYESTUFF MANUFACTURERS in that country, is making great headway and that already no fewer than 18 factories have arrived at an understanding.

A recent discussion among the French North African phosphate-mining interests has brought out the statement that the total annual PRODUCTION OF PHOSPHATES IN TUNISIA, Algeria, and Morocco is susceptible of an increase to 5,000,000 tons, of which amount Tunis should produce 2,000,000 tons.

AN EXPLOSION at the Thermit Co.'s works, Speke Road, Garston, resulted in the death from burns of John Robert Hurrell, of 33, Bennett Street, Garston, a smelter in the employ of the company. The inquest was opened on Monday and was adjourned until Wednesday next.

The Employers' Executive of the Chemical Federation have recommended ADOPTION OF THE INCREASED WAGES awarded by the Industrial Court, ranging from 2s. 6d. to 4s. weekly. At the same time they point out the existing chemical depression, and the danger of increased unemployment through increased wages.

At a joint conference of the South Wales PATENT FUEL TRADE at Cardiff, on Monday, representatives of the men's union admitted that the present circumstances of the industry precluded the possibility of granting the demand for increased wages. The employers denied a report that they intended to apply for a 20 per cent. wage reduction.

SS. "San Ricardo," 7,000 tons, is at Swansea preparing to sail for Tampico, Mexico, there to load with CRUDE OIL CON-SIGNED TO SWANSEA. With its arrival on the return voyage the oil tanker will inaugurate a new industry at the Welsh port which, it is anticipated, will show great development in the near future.

Building and other operations in connection with the NATIONAL OIL REFINERIES at Skewen and Swansea having been considerably affected by the bad weather, the date of the opening ceremony by Royalty, expected to take place during the early part of next month, will be postponed probably until the first week of March.

THE SECRETARY FOR MINES, who has appointed Mr. Thomas Harry Mottram, C.B.E., to be Chief Inspector for Mines, has also made the following appointments: Mr. Henry Walker, C.B.E., to be Deputy Chief Inspector for Mines; Mr. John Masterton, M.B.E., to be a divisional inspector of mines; and Mr. Edgar Hamilton Frazer, to be a senior inspector of mines.

The Board of Trade has, under the Gas Regulation Act, 1920, fixed the RATE OF CONTRIBUTION TO THE GAS FUND for the year 1921 at 3s. for each million cubic feet of gas sold during 1920. From this fund are paid the salaries, remuneration, pensions, and gratuities of the chief gas examiner, gas referees, and their assistants appointed under the Act for the testing of gas.

MR. WILLIAM JACKSON, whose death was announced in THE CHEMICAL AGE last week, acted for many years as chief chemical adviser to laboratories in the Potteries and during the war as superintendent technical chemist at Government establishments in Lancashire and Derbyshire, manufacturing cordite and other explosives. He founded the English Ceramic Society.

A NEW ALLOY of copper and aluminium ("alcobronze") has been invented and tested by the Swedish A.B. Skandinaviska Armaturfabriken. It has the colour and lustre of gold, and is claimed to be stronger, tougher, and harder than any other bronze known. It can be forged or rolled without deterioration, and is said to resist the influence of the air, acids and salt water.

A complaint by two coopers in the SHAWFIELD CHEMICAL WORKS recently came before the Glasgow Munitions Tribunal. They said that they had been dismissed without a week's notice. It appeared that after the men ignored the two minutes' silence on Armistice Day they were prevented from resuming work by other workers. The firm, therefore, terminated their contract, paying them a week's wages. The tribunal found that the men were guilty of misconduct in not obeying the firm's order.

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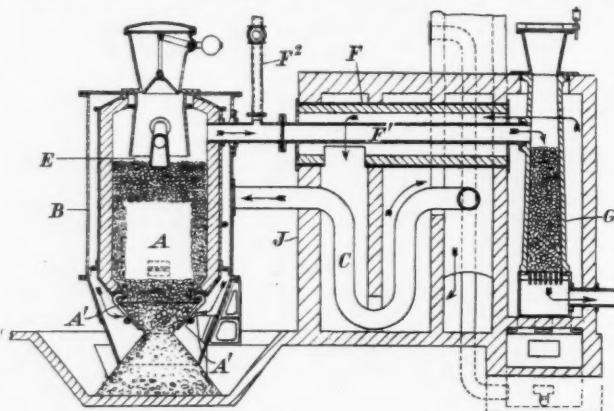
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### Abstracts of Complete Specifications

- 155,313. AMMONIA, PRODUCTION OF. A Rollason, 13, Lime Grove, Long Eaton, Derbyshire. Application date, June 17, 1919.

Coke, coke breeze, anthracite or hard coal is crushed and charged into a producer, *A*, having an outer shell, *B*. Air is saturated with steam and passed through the preheater, *C*, and jacket, *B*, to the grate, *A*<sup>1</sup>, and so into the fuel bed *E*. The steam is added in such proportion as to keep the temperature of the fuel below 950°C., and ensure that all the oxygen is combined. The gas leaves the producer by the pipe, *F*<sup>1</sup>, and steam is added by the pipe, *F*<sup>2</sup>, to cool the gas to about 500°C.,



155,313

or alternatively the gas may be passed through a cooler. The pipe, *F*<sup>1</sup>, is surrounded by a tube, *F*, through which hot gas is circulated to reheat the producer gas to 550°C.-600°C. The gas then passes through a tube, *G*, charged with coke breeze containing about 5 per cent. of crushed limestone, and maintained at about 700°C.-800°C. Under these conditions a reaction takes place whereby ammonia is produced, and the gases are then cooled down to about 90°C. and the ammonia recovered. The remaining gas is used to heat the converter, *G*, and the burnt gases pass through the tube, *F*, and thence into the chamber, *J*, to heat the preheater, *C*.

- 155,316. COOKING RETORT OVENS. W. J. Mellersh-Jackson, London. (From The Koppers Co., Union Arcade Building, Pittsburgh, Pa., U.S.A.). Application date, June 23, 1919.

The oven comprises a series of coking chambers with intermediate heating walls, having combustion flues of triangular cross section. The flues are arranged in two series which face alternately towards the coking chambers on each side of the heating wall. Each series of flues is provided with a conduit for combustion products above it, and means are provided for conducting the combustion products from one set of flues to the other. Gas and air are supplied to continuous rows of both series of flues fired simultaneously in each heating wall. A series of air regenerators and gas regenerators extend cross-wise of the battery of coking ovens, to preheat the air and gas supplies.

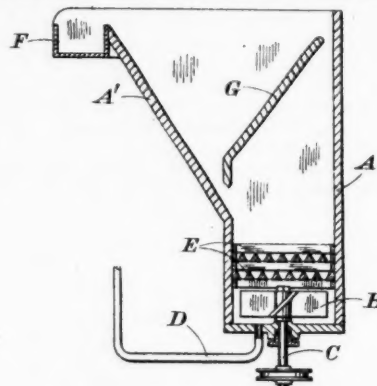
- 155,319. NITRO COMPOUNDS, NITROSO AND AZO COMPOUNDS, REDUCTION OF SUBSTITUTED. T. S. Moore, Hillside, Egham Hill, Surrey. Application date, July 14, 1919.

The object is to reduce substituted nitro compounds other than nitrobenzene and nitrophenol benzyl ethers or their derivatives without the use of hydro-chloric acid, which is liable to cause side reactions or discolour the product. It is found that this may be done by the use of cast-iron borings or turnings in conjunction with an aqueous solution of chloride instead of acid. Calcium chloride is preferred, but sodium chloride or ferrous chloride may be used. A detailed description is given of the preparation of *p*-aminophenol or *p*-amino-

phenol hydrochloride from *p*-nitrosophenol, the preparation of *o*-phenylene diamine from *o*-nitraniline, the preparation of *p*-amino acetanilide from *p*-nitro acetanilide, and the reduction of the sodium salt of *p*-hydroxy azobenzene *p*-sulphonic acid to *p*-aminophenol and sodium sulphanilate. In some cases the reduction may be supplemented with reduction by sulphuretted hydrogen.

- 155,349. FROTH-FLOTATION PROCESS, APPARATUS FOR. L. A. Wood, and Minerals Separation, Ltd., 62, London Wall, London, E.C.2. Application date, September 11, 1919.

The apparatus is for the froth flotation process of treating ore pulp, emulsions, or suspensions in liquids, and the principle is shown by a diagrammatic vertical transverse section. The mixing vessel comprises an upright box, *A*, square in horizontal section, provided with a horizontal, rotary agitator, *B*, mounted on a vertical spindle, *C*. A horizontal grid, *E*, is arranged above the agitator and comprises four series of horizontal bars of triangular cross section extending across the vessel close to one another, alternate series being at right angles



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to one another, and the parallel series being staggered in relation to one another. One wall of the vessel, *A*<sup>1</sup>, is inclined outwards so as to form a spitzkasten and an inclined baffle, *G*, extends from a point slightly below the liquid level to a point near the inclined wall, *A*<sup>1</sup>. Air is introduced through the pipe, *D*, and agitation of the pulp with the air is effected below the grid, *E*. The aerated pulp moves steadily upward above the grid, and the froth travels across the still surface of the water in the spitzkasten to the launder, *F*, while any particles discharged or "showered" from the froth are returned to the agitation and aeration zone. Other modifications are also described.

- 155,373. WHITE LEAD, MANUFACTURE OF ACID POTS TO BE EMPLOYED IN THE PRODUCTION OF. H. T. Arrowsmith, Wedgewood and Moorland Road Stilt Works, Burslem, Stoke-on-Trent. Application date, September 17, 1919.

The acid pot is first moulded to the desired shape with two or more projections on its upper edge, and the inside is glazed. The pots are then stacked one above the other in a kiln with their rims adjacent to one another, but slightly separated by the projections. The pots are then fired, and are prevented from sticking to one another by the projections. This method obviates the use of saggars.

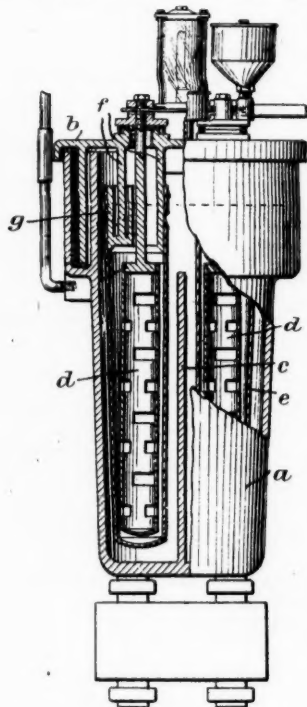
- 155,410. DIAZO COLOURING MATTERS, MANUFACTURE AND PRODUCTION OF. Brotherton & Co., Ltd., and R. W. Merriman, City Chambers, Leeds, and The Mersey Chemical Works, New Ferry, Cheshire. Application date, October 11, 1919.

Diazotised para-nitraniline is combined with salicylic acid, the nitro group is reduced to an amino group, and the amino group diazotised to produce para-diazo-benzol-azo-salicylic acid. This acid is combined with a 2-naphthylamine sulphonic acid, such as 2-naphthylamine-6-sulphonic acid, 2-naphthyl-



amine-5-sulphonic acid, or 2-naphthylamine-3-6-disulphonic acid. These colouring matters can be applied directly as acid-colouring matters to cotton and wool or they may be used in the form of their chromium lakes. They may be dyed on chrome-mordanted fibre or applied to the fibre and subsequently chromed, or they may be dyed by the metachrome process. The shades obtained are pink to red.

- 155,457. ELECTROLYTIC APPARATUS. I. H. Levin, 2635, Penn Avenue, Pittsburgh, Pa., U.S.A. Application date, December 31, 1919.



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reference is directed in pursuance of Section 7, Sub-section 4 of the Patents and Designs Acts, 1907 and 1919, to Specifications 12,765/1898, 21,557/1900 and 2,124/1912.

- 155,511. SEPARATING A VOLATILE LIQUID FROM SOLUTION IN A RELATIVELY NON-VOLATILE LIQUID, APPARATUS FOR. W. K. Lewis, 85, Lombard Street, Newton, Mass., U.S.A., and W. Green, 12, Garden Road, Newton, Mass., U.S.A. Application date, January 31, 1919.

A volatile liquid such as gasoline or benzol is separated from a heavy hydro-carbon oil in which it is dissolved by passing the mixture through a vertical series of separately heated perforated pans within a casing in such a way that the separated vapours flow upwards against the current of liquid and the two are in intimate contact. A vacuum is maintained in the casing.

- 155,522. MINERAL RESIDUES, PROCESS FOR THE CONGLOMERATION OF—IN A PULVERULENT CONDITION. L. Ayestaran é Irizusta, 1, Avenida Delos Fueros, Guipuscoa, Spain. Application date, June 29, 1920.

Pulverulent mineral residues, e.g., iron ore, are mixed with a binder consisting of pure alumina and water and moulded into briquettes, which may be smelted.

NOTE.—The following specifications, which are now accepted, were abstracted in THE CHEMICAL AGE when they became open to inspection under The International Convention: 139,160 (B. Rader and Aktieselskabet Zink), relating to electric furnaces for the production of zinc, see Vol. II., p. 479; 142,081 (G. Kereszty and E. Wolf) relating to basic magnesium hypochlorite, see Vol. III., p. 16; 142,507 (A. Schmidt) relating to production of oxygenated compounds from paraffin wax, see Vol. III., p. 79; 144,728 (F. Krupp Akt.-Ges. Grusonwerk,

relating to extracting metals from ores, furnace dust, &c., see Vol. III., p. 214; 148,579 (Sudfeldt & Co.) relating to sulpho-acids and alkyl-sulphuric acids from acid resins, see Vol. III., p. 487.

#### International Specifications not yet Accepted

- 152,960. ORGANIC REACTIONS AT HIGH TEMPERATURES. F. Fischer, 2, Kaiser Wilhelm, Platz, Mulheim-on-Ruhr, Germany. International Convention date, October 22, 1919.

In high temperature, organic reactions, such as the production of benzene and toluene from cresol by treatment with hydrogen at 800°C., the deposition of carbon on the metallic parts of the apparatus, is prevented by a coating of tin or an alloy of tin. This coating also acts as a catalyst.

- 152,975. HYDROGEN. C. Toniolo and Officine Elettrochimiche, Dr. Rossi, Legnano, Italy. International Convention date, October 21, 1919.

Gases from electric or blast smelting furnaces which are fed with oxygen are treated with steam in the presence of a catalyst. A mixture of hydrogen, steam, carbon monoxide and carbon dioxide is obtained, and the gases, other than hydrogen, are eliminated by passing through water scrubbers, and treating with caustic soda, copper salts, &c. If the furnaces are fed with air, nitrogen is also present. The hydrogen from electric furnace gases may be mixed with the poorer mixture from blast furnace gases, or with nitrogen to obtain a mixture suitable for the synthesis of ammonia. The hydrogen obtained may also be used for the hydrogenation of fats.

- 152,997. ZINC, TREATING. Electrolytic Zinc Co., of Australasia. Proprietary, 360, Collins Street, Melbourne. International Convention date, October 24, 1919.

Zinc dust is stirred with boiling water or with caustic soda solution, and its activity is thereby increased for purification of zinc salt solutions, which are to be electrolysed or for use in reducing organic compounds.

- 153,006. FERTILISERS, TREATING GAS LIQUOR TO FORM. Ges. fur Landwirtschaftlichen Bedarf, 20, Elisabethstrasse, Munich, and I. R. Mandelbaum, 91, Landsbergerstrasse, Munich. International Convention date, February 24, 1919.

Gas liquor is treated with yellow ammonium sulphide or sulphur, or with air to separate the sulphur from the sulphur compounds. Ammonium cyanide is thus converted into sulphocyanide, which remains as a residue when the liquor is distilled.

- 153,007. SODIUM PENTABORATE AND BORIC ACID. Schott & Gen, Otto-Schott-Strasse, Jena, Germany. International Convention date, October 24, 1919.

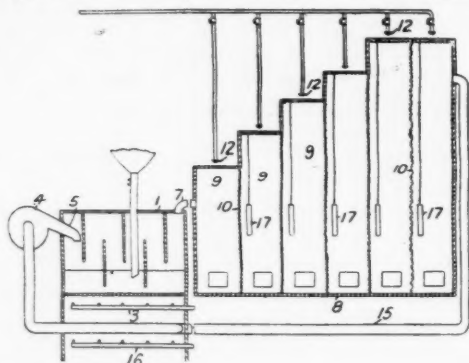
Sodium pentaborate,  $\text{Na}_2\text{O}_5 \cdot \text{B}_2\text{O}_3 \cdot 10\text{H}_2\text{O}$ , is obtained by treating boro-natro-calcite with water or mother liquor and sulphuric acid sufficient to produce calcium sulphate, but not to render the solution acid. The mixture is heated to 75°C, filtered, concentrated, and cooled. The residue is then treated in a similar manner but with sulphuric acid sufficient to acidify the solution, and then filtered. Boric acid is recovered from the filtrate and calcium sulphate remains.

- 153,254. AMMONIA, SYNTHETIC, MANUFACTURE OF. Soc l'Air Liquide (Soc. Anon. pour l'Etude et l'Exploitation des Procédés, G. Claude), 48, Rue St. Lazare, Paris. International Convention date, October 28, 1919.

The object is to produce a catalyst for the synthesis of ammonia at very high pressures. Iron or steel is fused under a jet of oxygen and the resulting mixture of iron and iron monoxide is placed in a magnesia crucible with 5-10 per cent. of lime and a small quantity of alkaline oxides. The mixture is again subjected to an oxygen jet when the lime and some magnesia dissolve in the molten mixture. When a homogeneous mass is obtained, it is cast on a sheet of iron, and consists mainly of iron oxide  $\text{Fe}_2\text{O}_3$ , which is used as the catalyst.

- 153,252. PHTHALIC ANHYDRIDE. Selden Co., 810, House Building, Pittsburg, Pa., U.S.A. (Assignees of C. E. Andrews, House Building, Pittsburg, Pa., U.S.A.). International Convention date, October 14, 1919.

Naphthalene vapour mixed with air is passed over molybdenum oxide or other catalyst at 350°-550°C., and the crude phthalic anhydride is vaporised in a vessel 1, by burners 3. The vapour is carried off by inert gas supplied by the pump 4, and passes into a casing 8, having a number of vertical screens 10. The vapour is fractionally condensed in the chambers 9 thus

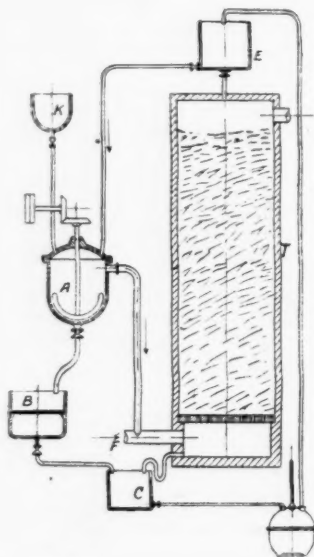


153,252

formed, which are kept at the proper temperatures by means of spray nozzles 12. Phthalic anhydride in the form of colourless crystals melting above 130°C. is deposited in the first few compartments, and the inert gas passes back by the pipe 15, to the pump 4, to be used again.

153,265. DINITRO-PHENOL. Norsk Hydro-Elektrisk Kvaestofaktieselskab, 7, Solligaten, Christiania. International Convention date, October 29, 1919.

Fused phenol passes from a vessel K, to a vessel A, where it is nitrated with dilute nitric acid, and the mixture is then passed to the filter B, where the dinitrophenol is collected. The oxides of nitrogen evolved pass to a tower T, where they are absorbed by dilute nitric acid. This stronger acid is then mixed with the spent acid in the vessel C and forced into the supply tank E, to be used again for nitration.



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153,290. AMMONIA, SYNTHETIC, MANUFACTURE OF. Norsk Hydro-Elektrisk Kvaestofaktieselskab, 7, Solligaten, Christiania. International Convention date, October 28, 1919.

The object is to produce a catalyst by which the synthesis of ammonia may be effected at a temperature below 400°C. and a pressure below 100 atmospheres. Compounds such as ferrous cyanide, ferrocyanhydric acid, ammonium ferrocyanide, triammonium-potassium ferrocyanide, potassium ferrous ferrocyanide or potassium ferric ferrocyanide, are heated to a temperature below 500°C. in a neutral atmosphere. Simple cyanides of iron, nickel, cobalt, chromium, or complex cyanides in which alkali or alkaline earth cyanides are either absent or are present in molecular proportion of less than 2:1, may also be used. If the compound does not contain any alkali or alkaline earth metals, a compound of such metal is preferably added.

153,297. SULPHUR. FARBEFABRIKEN VORM. F. Bayer & Co., Leverkusen, near Cologne. International Convention date, October 30, 1919.

Sulphuretted hydrogen or a gas containing it such as coal gas, is mixed with air or oxygen and passed over a special variety of porous carbon without heating. Sulphur is deposited on the carbon, and is subsequently sublimed or dissolved. If the proportion of sulphuretted hydrogen is small, a small quantity of ammonia or an amine is added to accelerate the reaction.

#### LATEST NOTIFICATIONS.

- 156,561. Alloys of metals of ferro-chromium group and silicon or its compounds. Walter, R. January 7, 1920.
- 156,562. Apparatus for the separation of coke or carbon from slag or the like. Soc. Le Coke Industrie. January 7, 1920.
- 156,187. Process for regenerating metallic mercury. Chemische Fabrik Worms Akt. Ges. January 24, 1919.
- 156,190. Process for the production of alpha-lobelin. Boehringer, Sohn, C. H. [Firm of], September 21, 1916.
- 156,213. Manufacture of metal salts. Chemische Fabriken Worms Akt. Ges. March 13, 1918.
- 156,215. Manufacture of anthraquinone and its derivatives. Chemische Fabriken Worms Akt. Ges. May 18, 1918.
- 156,218. Process and apparatus for fractional distillation. Chenard, E. A. R. January 3, 1920.
- 156,244. Process for the catalytic oxidation of organic compounds. Wohl, A. December 18, 1916.
- 156,250. Production of oil colours, varnishes, polishes, and the like. Akt. Ges. Fur. Anilin-Fabrikation. December 18, 1915.
- 156,252. Manufacture of oxidation products of organic compounds. Chemische Fabriken Worms Akt. Ges. July 15, 1919.
- 156,254. Manufacture of new tanning materials and process of tanning therewith. Chemische Fabriken and Asphaltwerke Akt. Ges. September 1, 1916.
- 152,255. Manufacture of constituents of low boiling point from tar products, resins, mineral oils, and the like. Chemische Fabriken Worms Akt. Ges. January 23, 1917.
- 156,259. Distillation process for the recovery of fatty acids from fatty-acid mixtures. Byk-Guldenwerke. Chemische Fabrik Akt. Ges. June 27, 1916.
- 156,479. Process for fixing atmospheric nitrogen. Nitrogen Products Co. July 5, 1919.
- 156,517. Lubricating oil emulsion. Larger, H. August 9, 1916.
- 156,538. Manufacture of anthraquinone or its derivatives. Chemische Fabriken Worms Akt. Ges. December 1, 1919.
- 156,139. Manufacture of products of low-boiling point from tar products, resins, mineral oils, and the like. Chemische Fabriken Worms Akt. Ges. March 1, 1917.
- 156,543. Process for separating or isolating organic gases or vapours or organic products. Farbenfabriken Worm. F. Bayer & Co. November 3, 1916.
- 156,547. Process for the extraction of potash from leucite or leucite rocks in general. Jourdan, F. and Blanc, G. A. January 5, 1920.
- 156,552. Lead alloys. Mathesius, W. January 7, 1920.
- 156,594. Process for obtaining paraffin and highly viscous lubricating oils from bituminous masses. Erdmann, E. January 22, 1918.

#### Specifications Accepted, with Date of Application

- 135,186. Manganese or alloys of manganese, Production of. Aktiebolaget Ferrolegeringar. November 12, 1918.
- 137,071. Nitrous gases and nitric acid, Production of concentrated. Norsk Hydro-Elektrisk Kvaestofaktieselskab. October 21, 1916.
- 137,827. Centrifuges. C. A. Fesca and Sohn. June 26, 1915.
- 138,924. Zinc oxide, Method of treating. New Jersey Zinc Co. August 9, 1918.
- 139,147. Phenols and aldehydes, Process for the production of condensation products of. L. A. Jaloustre, Z. Kheifetz, and M. Warchavsky. September 23, 1919. Addition to 138,061.
- 145,397. Centrifuges. C. A. Fesca and Sohn. June 18, 1919.
- 145,600. Copper from nickel, Process of electrolytically separating. P. Goldberg. July 9, 1918.
- 145,732. Acid-resisting receptacles such as boilers, pipes, and the like. F. Krupp Akt.-Ges. June 17, 1918.
- 150,333. Slags, containing iron, Process of separating—from coke and other fuel residues. F. Krupp Akt.-Ges. Grusonwerke. August 26, 1919.
- 151,260. Electrolytic tanks with diaphragm cells. G. Haglund. September 17, 1919.
- 153,041. Ammonia. Process for the direct oxidation of. L. Duparc and C. Urfer. September 24, 1918.
- 155,895. Peat, Treatment of. D. B. Macdonald and Densified Peat Fuel & Products Ltd. September 20, 1919.
- 155,945. Lead sulphate, Process for making. P. A. Mackay. October 18, 1919.
- 156,029. Retort furnace for use in making gas. B. R. Pfeifer. March 20, 1920.
- 156,034. Coke ovens. E. C. R. Marks. (Soc. Franco-Belge de Fours a Coke). April 12, 1920.

# Market Report and Current Prices

*Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

## Market Report

THURSDAY, January 20.

The improved tendency which we indicated last week has been maintained although unfortunately the demand in all quarters leaves much to be desired. On the other hand, there is comparatively little change in price, and there are reasons to hope that the worst shades of the depression are passing away.

There is moderate inquiry on export account, but business continues to present the almost insuperable difficulties to which we have referred so often.

### General Chemicals

ACETONE has been in demand on export account, and is without change in value.

ACETIC ACID has been bought for both spot and forward delivery, and with several manufacturers well occupied for early delivery, the tendency is inclined to be firmer.

ACID CARBOLIC remains a weak market, and favours sellers.

ACID FORMIC is not in good demand, and the prices are regarded as having reached an uneconomic level.

ACID OXALIC is lower in price, and only in fair demand.

ACID TARTARIC is easy in price, and the demand is very unsatisfactory.

AMMONIA CARBONATE.—English makers have reduced their price.

BLEACHING POWDER remains unchanged with little doing.

COPPER SULPHATE.—Still some inquiry, but the exchange situation renders business most difficult. The tendency remains easy.

FORMALDEHYDE is rather firmer in price, and comparatively little is offered for early delivery.

LEAD ACETATE.—A little business has been passing during the last few days, but prices are very unattractive.

LITHOPONE has been a better market, and a more satisfactory volume of business is reported.

MAGNESIUM SALTS are still hanging fire, and no business of importance is indicated.

POTASSIUM CARBONATE is slow of sale, and the price continues on the downward grade.

POTASSIUM CAUSTIC is in very small demand, and the price favours buyers.

POTASSIUM PRUSSATE is rather easier for forward delivery, but the spot market is almost bare, and the small supplies available are firmly held.

SALAMMONIAC.—English makers have substantially reduced their price.

### Coal Tar Intermediates

There is little fresh to report in this section. Business remains on the quiet side. Values as a whole are maintained.

ALPHA NAPHTHYLAMINE is in only poor request, but makers adhere to their prices.

BETA NAPHTHOL is in better demand, although most of the cheap valued parcels now appear to be absorbed.

DINITROPHENOL is little asked for. The price is firm.

DIPHENYLAMINE is occasionally inquired for, and supplies appear to be very light.

NITROBENZOL is slightly more active, but more business could be dealt with.

PARANITRANILINE is idle and price is easy.

SALICYLIC ACID remains stagnant and without feature.

### Coal Tar Products

There is little new business doing, and the prices of most articles continue to show an easier tendency.

90's BENZOL.—The irregularity in price mentioned last week continues and business is reported in the North at prices ranging from 2s. 7d. on rails to 2s. 11d., and in the South, business is reported at from 2s. 10d. to 3s. 1d.

PURE BENZOL is in poor demand and is not worth more than 3s. on rails.

CREOSOTE OIL is in moderate demand, and the price is fairly steady at about 1s. a gallon in the North, and 1s. 1d. to 1s. 2d. per gallon in the South.

CRESYLIC ACID is inactive, Dark 95/97 per cent. being worth 2s. 9d. to 3s., and Pale 97/99 per cent. 3s. 6d. to 3s. 9d.

SOLVENT NAPHTHA is weak and is quoted at 2s. 6d. on rails.

HEAVY NAPHTHA is in moderate demand and is quoted at 3s. 3d. on rails.

NAPHTHALENE.—Prices for naphthalene are more or less nominal as there is practically no business doing in this article. Crude qualities are quoted at from £9 to £15 per ton, while refined is worth from £24 to £30.

PITCH.—There are no new features to report. There is still a small inquiry from the Continent for shipment over the next three months, but very little business has been recorded.

### Sulphate of Ammonia

SODIUM ACETATE is in decidedly better demand and there is a welcome absorption of second-hand parcels which have been hawked about for some time.

SODIUM BICHROMATE is still forced down by second-hand offerings, and there is not likely to be an improvement until weak sellers are eliminated.

SODIUM CAUSTIC is again lower on the second-hand market, and there is little business to report.

SODIUM HYPOSULPHITE is weak and no important business is to be discerned.

SODIUM NITRITE is offered at low prices on realisation account, but some makers are inclined to hold off.

SODIUM PRUSSATE is distinctly weaker, the English manufacturers having reduced their prices to meet Continental competition.

ZINC OXIDE is quiet and unchanged.

The demand both for home trade and export is very limited. The price for export to British Colonies has been further reduced to £24 per ton f.o.b.

## Current Prices

### Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride .....	lb.	0	2	6	to	0	2	9
Acetone oil .....	ton	90	0	0	to	95	0	0
Acetone, pure .....	ton	110	0	0	to	115	0	0
Acid, Acetic, glacial, 99-100% .....	ton	70	0	0	to	72	0	0
Acetic, 80% pure .....	ton	56	0	0	to	57	10	0
Arsenic .....	ton	100	0	0	to	105	0	0
Boric, cryst. ....	ton	72	10	0	to	74	0	0
Carbolic, cryst. 39-40% .....	lb.	0	0	9½	to	0	0	10
Citric .....	lb.	0	2	6	to	0	2	9
Formic, 80% .....	ton	85	0	0	to	90	0	0
Gallic, pure .....	lb.	0	5	9	to	0	6	0
Hydrofluoric .....	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol. ....	ton	42	10	0	to	42	10	0
Lactic, 60 vol. ....	ton	47	10	0	to	50	0	0
Nitric, 80 Tw. ....	ton	41	0	0	to	44	0	0
Oxalic .....	lb.	0	1	1	to	0	1	2
Phosphoric, 1.5 .....	ton	65	0	0	to	67	0	0
Pyrogallic, cryst .....	lb.	0	11	6	to	0	11	9
Salicylic, Technical .....	lb.	0	1	4	to	0	1	6
Salicylic, B.P. ....	lb.	0	1	6	to	0	1	8
Sulphuric, 92-93% .....	ton	8	10	0	to	8	15	0
Tannic, commercial .....	lb.	0	3	6	to	0	3	9
Tartaric .....	lb.	0	2	0	to	0	2	1
Alum, lump .....	ton	19	10	0	to	20	0	0
Alum, chrome .....	ton	55	0	0	to	60	0	0
Alumina ferric .....	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15% .....	ton	13	5	0	to	14	5	0
Aluminium, sulphate, 17-18% .....	ton	16	0	0	to	17	0	0
Ammonia, anhydrous .....	lb.	0	2	2	to	0	2	4
Ammonia, .880 .....	ton	43	0	0	to	45	0	0
Ammonia, .920 .....	ton	30	0	0	to	32	10	0
Ammonia, carbonate .....	lb.	0	0	6	to	—	—	—



	per	£	s.	d.	£	s.	d.		per	£	s.	d.	£	s.	d.		
Ammonia, chloride.....	ton	85	0	0	to	90	0	0	Tartar emetic ...	lb.	0	2	6	to	0	2	9
Ammonia, muriate (galvanisers) ...	ton	57	10	0	to	60	0	0	Tin perchloride, 33% .....	lb.	0	2	6	to	0	2	7
Ammonia, nitrate .....	ton	55	0	0	to	60	0	0	Perchloride, solid .....	lb.	0	3	0	to	0	3	3
Ammonia, phosphate .....	ton	95	0	0	to	100	0	0	Protochloride (tin crystals)....	lb.	0	2	0	to	0	2	1
Ammonia, sulphocyanide .....	lb.	0	3	0	to	0	3	3	Zinc chloride, 102 Tw. ....	ton	22	0	0	to	23	10	0
Amyl acetate .....	ton	420	0	0	to	425	0	0	Chloride, solid, 96-98%.....	ton	60	0	0	to	65	0	0
Arsenic, white, powdered .....	ton	77	10	0	to	80	0	0	Oxide, 99% .....	ton	45	0	0	to	47	10	0
Barium, carbonate, 92-94%.....	ton	12	10	0	to	13	0	0	Dust, 90% .....	ton	90	0	0	to	92	10	0
Barium, chlorate .....	lb.	0	0	11	to	0	1	0	Sulphate .....	ton	21	10	0	to	23	10	0
Chloride .....	ton	21	0	0	to	23	0	0									
Nitrate .....	ton	55	0	0	to	56	0	0									
Barium Sulphate, blanc fixe, dry...	ton	30	0	0	to	31	0	0									
Sulphate, blanc fixe, pulp ...	ton	16	10	0	to	17	0	0									
Sulphocyanide, 95% .....	lb.	0	1	6	to	0	1	8									
Bleaching powder, 35-37% .....	ton	22	0	0	to	23	0	0									
Borax crystals .....	ton	39	0	0	to	41	0	0									
Calcium acetate, Brown .....	ton	15	0	0	to	17	0	0									
Grey .....	ton	23	0	0	to	25	0	0									
Calcium Carbide .....	ton	29	0	0	to	30	0	0									
Chloride .....	ton	12	10	0	to	13	0	0									
Carbon bisulphide .....	ton	65	0	0	to	67	0	0									
Casein, technical .....	ton	90	0	0	to	92	0	0									
Cerium oxalate .....	lb.	0	3	9	to	0	4	0									
Chromium acetate .....	lb.	0	1	2	to	0	1	4									
Cobalt acetate .....	lb.	0	11	6	to	0	12	6									
Oxide, black .....	lb.	1	0	0	to	1	0	6									
Copper chloride .....	lb.	0	1	3	to	0	1	6									
Sulphate .....	ton	39	0	0	to	40	0	0									
Cream Tartar, 98-100% .....	ton	200	0	0	to	210	0	0									
Epsom salts (see Magnesium sulphate)																	
Formaldehyde 40% vol. ....	ton	130	0	0	to	135	0	0									
Formosol (Rongalite) .....	lb.	0	4	9	to	0	5	1									
Glauber salts .....	ton	Nominal.															
Glycerine, crude .....	ton	70	0	0	to	72	10	0									
Hydrogen peroxide, 12 vols. ....	gal.	0	2	8	to	0	2	9									
Iron perchloride .....	ton	50	0	0	to	52	0	0									
Iron sulphate (Copperas) .....	ton	4	0	0	to	4	5	0									
Lead acetate, white .....	ton	58	0	0	to	65	0	0									
Carbonate (White Lead).....	ton	53	0	0	to	50	0	0									
Nitrate .....	ton	62	10	0	to	65	0	0									
Litharge .....	ton	53	0	0	to	55	0	0									
Lithopone, 30% .....	ton	37	10	0	to	40	0	0									
Magnesium chloride .....	ton	15	10	0	to	16	10	0									
Carbonate, light.....	cwt.	2	15	0	to	3	0	0									
Sulphate (Epsom salts commercial)	ton	12	10	0	to	13	0	0									
Sulphate (Druggists') .....	ton	18	10	0	to	19	10	0									
Manganese, Borate .....	ton	190	0	0	to	—											
Sulphate .....	ton	130	0	0	to	135	0	0									
Methyl acetone .....	ton	95	0	0	to	100	0	0									
Alcohol, 1% acetone .....	gal.	Nominal.															
Nickel sulphate, single salt .....	ton	60	0	0	to	62	0	0									
Nickel ammonium sulphate, double salt.....	ton	62	0	0	to	64	0	0									
Potassium bichromate .....	lb.	0	1	3	to	0	1	4									
Carbonate, 90% .....	ton	85	0	0	to	90	0	0									
Chloride .....	ton	50	0	0	to	52	0	0									
Chlorate .....	lb.	0	0	8½	to	0	0	9									
Meta bisulphite, 50-52% .....	ton	290	0	0	to	205	0	0									
Nitrate, refined .....	ton	63	0	0	to	65	0	0									
Permanganate .....	lb.	0	2	6	to	0	2	9									
Prussiate, red .....	lb.	0	3	0	to	0	3	3									
Prussiate, yellow .....	lb.	0	1	6	to	0	1	7									
Sulphate, 90% .....	ton	31	0	0	to	33	0	0									
Salammoniac, firsts .....	cwt.	5	0	0	to	—											
Seconds .....	cwt.	4	15	0	to	—											
Sodium acetate .....	ton	45	0	0	to	47	10	0									
Arsenate, 45% .....	ton	60	0	0	to	62	0	0									
Bicarbonate .....	ton	10	10	0	to	11	0	0									
Bichromate .....	lb.	0	0	9½	to	0	0	10									
Bisulphite, 60-62% .....	ton	37	10	0	to	40	0	0									
Chlorate .....	lb.	0	0	5½	to	0	0	5½									
Caustic, 70% .....	ton	27	0	0	to	28	0	0									
Caustic, 76% .....	ton	28	0	0	to	29	0	0									
Hydrosulphite, powder, 85% .....	lb.	0	2	3	to	0	2	6									
Hyposulphite, commercial.....	ton	26	0	0	to	27	0	0									
Nitrite, 96-98% .....	ton	60	0	0	to	62	0	0									
Phosphate, crystal.....	ton	32	0	0	to	35	0	0									
Perborate .....	lb.	0	2	2	to	0	2	4									
Prussiate .....	lb.	0	0	10	to	0	0	10½									
Sulphide, crystals .....	ton	22	0	0	to	25	0	0									
Sulphide, solid, 60-62% .....	ton	45	0	0	to	47	0	0									
Sulphite, cryst. ....	ton	15	0	0	to	16	0	0									
Strontium carbonate .....	ton	85	0	0	to	90	0	0									
Strontium Nitrate .....	ton	90	0	0	to	95	0	0									
Sulphate, white .....	ton	8	10	0	to	10	0	0									
Sulphur chloride .....	ton	42	0	0	to	44	10	0									
Sulphur, Flowers .....	ton	19	0	0	to	19	10	0									
Roll .....	ton	19	0	0	to	19	10	0									

Coal Tar Intermediates, &c.									
Alphanaphthol, crude .....	lb.	0	4	0	to	0	4	3	
Alphanaphthol, refined .....	lb.	0	4	6	to	0	4	9	
Alphanaphthylamine .....	lb.	0	3	3	to	0	3	6	
Aniline oil, drums extra .....	lb.	0	1	8	to	0	1	9	
Aniline salts .....	lb.	0	1	10	to	0	2	0	
Anthracene, 85-90% .....	lb.	—			to	—			
Benzaldehyde (free of chlorine)....	lb.	0	5	9	to	0	6	0	
Benzdine, base .....	lb.	0	11	6	to	0	12	0	
Benzdine, sulphate .....	lb.	0	10	0	to	0	10	6	
Benzoic acid .....	lb.	0	2	6	to	0	2	9	
Benzoate of soda .....	lb.	0	2	6	to	0	2	9	
Benzyl chloride, technical .....	lb.	0	2	0	to	0	2	3	
Betanaphthol benzoate .....	lb.	0	9	6	to	0	10	0	
Betanaphthol .....	lb.	0	3	0	to	0	3	3	
Betanaphthylamine, technical.....	lb.	0	11	6	to	0	12	6	
Croceine Acid, 100% basis .....	lb.	0	5	0	to	0	6	3	
Dichlorbenzol .....	lb.	0	0	9	to	0	0	10	
Diethylaniline .....	lb.	0	6	9	to	0	7	6	
Dinitrobenzol .....	lb.	0	1	5	to	0	1	6	
Dinitrochlorbenzol .....	lb.	0	1	5	to	0	1	6	
Dinitronaphthalene .....	lb.	0	1	6	to	0	1	8	
Dinitrotoluol .....	lb.	0	1	8	to	0	1	9	
Dinitrophenol .....	lb.	0	3	0	to	0	3	3	
Dimethylaniline .....	lb.	0	5	9	to	0	6	0	
Diphenylamine .....	lb.	0	5	0	to	0	5	3	
H-Acid .....	lb.	0	14	0	to	0	14	6	
Metaphenylenediamine .....	lb.	0	5	9	to	0	6	0	
Monochlorbenzol .....	lb.	0	0	10	to	0	1	0	
Metanilic Acid .....	lb.	0	7	6	to	0	8	6	
Monosulphonic Acid (2.7).....	lb.	0	7	6	to	0	8	0	
Naphthienic acid, crude .....	lb.	0	4	0	to	0	4	3	
Naphthionate of Soda .....	lb.	0	4	3	to	0	4	6	
Naphthylamin-di-sulphonic-acid...	lb.	0	5	0	to	0	5	6	
Nitronaphthalene .....	lb.	0	1	6	to	0	1	8	
Nitrotoluol .....	lb.	0	1	4	to	0	1	5	
Orthoamidophenol, base.....	lb.	0	18	0	to	0	1	0	
Orthodichlorbenzol .....	lb.	0	1	1	to	0	1	2	
Orthotoluidine .....	lb.	0	2	3	to	0	2	6	
Orthonitrotoluol .....	lb.	0	1	3	to	0	1	4	
Para-amidophenol, base .....	lb.	0	12	6	to	0	13	0	
Para-amidophenol, hydrochlor ....	lb.	0	13	0	to	0	13	6	
Paradichlorbenzol .....	lb.	0	0	7	to	0	0	8	
Paranitraniline .....	lb.	0	7	6	to	0	7	9	
Paranitrophenol .....	lb.	0	2	9	to	0	3	0	
Paranitrotoluol .....	lb.	0	5	9	to	0	6	0	
Paraphenylenediamine, distilled ...	lb.	0	13	6	to	0	14	6	
Paratoluidine .....	lb.	0	8	3	to	0	8	6	
Phthalic anhydride .....	lb.	0	4	9	to	0	5	1	
Resorcin, technical .....	lb.	0	7	6	to	0			

## Coal Tar Intermediates, &amp;c.

Alphanaphthol, crude .....	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined .....	lb.	0	4	6	to	0	4	9
Alphanaphthylamine.....	lb.	0	3	3	to	0	3	6
Aniline oil, drums extra .....	lb.	0	1	8	to	0	1	9
Aniline salts .....	lb.	0	1	10	to	0	2	0
Anthracene, 85-90% .....	lb.	0	—	—	to	0	—	—
Benzaldehyde (free of chlorine)....	lb.	0	5	9	to	0	6	0
Benzidine, base .....	lb.	0	11	6	to	0	12	0
Benzidine, sulphate .....	lb.	0	10	0	to	0	10	6
Benzoic acid .....	lb.	0	2	6	to	0	2	9
Benzoate of soda .....	lb.	0	2	6	to	0	2	9
Benzyl chloride, technical .....	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate.....	lb.	0	9	6	to	0	10	0
Betanaphthol .....	lb.	0	3	0	to	0	3	3
Betanaphthylamine, technical.....	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis .....	lb	0	5	0	to	0	6	3
Dichlorobenzol .....	lb.	0	0	9	to	0	0	10
Diethylaniline .....	lb.	0	6	9	to	0	7	6
Dinitrobenzol .....	lb.	0	1	5	to	0	1	6
Dinitrochlorobenzol .....	lb.	0	1	5	to	0	1	6
Dinitronaphthaline .....	lb.	0	1	6	to	0	1	8
Dinitrotolul .....	lb.	0	1	8	to	0	1	9
Dinitrophenol.....	lb.	0	3	0	to	0	3	3
Dimethylaniline .....	lb.	0	5	9	to	0	6	0
Diphenylamine.....	lb.	0	5	0	to	0	5	3
H-Acid.....	lb.	0	14	0	to	0	14	6
Metaphenylenediamine .....	lb.	0	5	9	to	0	6	0
Monochlorobenzol .....	lb.	0	0	10	to	0	1	0
Metanilic Acid .....	lb.	0	7	6	to	0	8	0
Monosulphonic Acid (2:7).....	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude .....	lb.	0	4	0	to	0	4	3
Naphthionate of Soda.....	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid...	lb.	0	5	0	to	0	5	6
Nitronaphthaline .....	lb.	0	1	6	to	0	1	8
Nitrotolul .....	lb.	0	1	4	to	0	1	5
Orthoamidophenol, base.....	lb.	0	18	0	to	0	1	0
Orthodichlorobenzol .....	lb.	0	1	1	to	0	1	2
Orthotoluidine .....	lb.	0	2	3	to	0	2	6
Orthonitrotolul.....	lb.	0	1	3	to	0	1	4
Para-amidophenol, base .....	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor .....	lb.	0	13	0	to	0	13	6
Paradichlorobenzol .....	lb.	0	0	7	to	0	0	8
Paranitraniline .....	lb.	0	7	6	to	0	7	9
Paranitrophenol .....	lb.	0	2	9	to	0	3	0
Paranitrotolul .....	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled ...	lb.	0	13	6	to	0	14	6
Paratoluidine.....	lb.	0	8	3	to	0	8	6
Phthalic anhydride.....	lb.	0	4	9	to	0	5	1
Resorcin, technical .....	lb.	0	7	6	to	0	8	6
Resorcin, pure .....	lb.	0	10	6	to	0	11	0
Salol .....	lb.	0	4	3	to	0	4	6
Sulphanilic acid, crude .....	lb.	0	1	8	to	0	1	9
Tolidine, base .....	lb.	0	8	6	to	0	10	0
Tolidine, mixture .....	lb.	0	2	9	to	0	3	0

## Company News

### Interest Payments, &c.

**BRITISH DYESTUFFS CORPORATION.**—The transfer register of the preference shares is closed from January 18 to 31, inclusive.

### Reduction of Capital

**OIL EXTRACTORS, LTD.**—In the Chancery Division, on Tuesday, Mr. Justice Astbury confirmed a resolution of Oil Extractors, Ltd., reducing the capital of the Company from £50,000 to £35,000, and returning the difference to the shareholders as being capital in excess of the needs of the company.

### Company Meeting

**ELPHIL RUBBER CO.**—At an extraordinary meeting of the Elphil Rubber Co., Ltd., on January 14, Mr. A. F. Lake, J.P., presiding, resolutions were carried approving the voluntary liquidation of the company, and the sale of the estates to the London Asiatic Rubber & Produce Co., Ltd. The chairman, in moving the resolutions, said that the board had received the assent of practically the whole of the shareholders.

### Dividend Dates

**BLEACHERS' ASSOCIATION.**—Preference, 16½, January 21.  
**CANADIAN EXPLOSIVES.**—Common, 2 per cent, January 30.  
**ENGLISH CHINA CLAY.**—Preference, 7 per cent. (per annum), February 2.  
**NOBEL INDUSTRIES.**—Preference, 7½, February 1.  
**VIRGINIA (CAROLINA) CHEMICALS.**—£1, February 1.  
**ANGLO-PERSIAN OIL.**—Preference, 1s., January 31.  
**BRITISH BURMAH PETROLEUM.**—1s., free of tax, February 28.  
**LOBITOS OILFIELDS.**—1s., February 1.  
**TRINIDAD LEASEHOLDS.**—2s. 6d., January 26.

### Notices

**ANGLO-CONTINENTAL GUANO WORKS.**—Dealings in the following securities have been specially allowed by the Stock Exchange Committee under Temporary Regulation 4 (3) (these securities will rank *pari passu* with those in which special settling days have already been appointed, as soon as they are identical and the certificates are ready for distribution, and with those for which an official quotation has already been granted as soon as they are identical and are officially quoted): Anglo-Continental Guano Works.—75,000 7½ per cent. Cumulative Preference shares of £1 each, fully paid, Nos. 225,001 to 300,000.

**MEXICAN EAGLE OIL CO.**—Holders of provisional certificates dated December 15, 1919, are reminded that until such certificates are exchanged for definitive shares warrants they cannot participate in the present offer to shareholders of one new ordinary share at par for every two shares, either preference or ordinary, held by them.

### Reports and Dividends

**INTERNATIONAL NICKEL.**—Quarterly dividend of 1½ per cent. on preferred stock, payable February 1 to holders of record January 15.

**BRITISH DYESTUFFS CORPORATION.**—A dividend at the rate of 7 per cent. per annum, payable Feb. 1, has been declared on the preference shares in respect of the half-year to Oct. 31 last. It is anticipated that the company's statement of accounts for the year to that date will be available for presentation to the shareholders early in March, with the report of the directors and their recommendations as to the disposal of the balance of profit available for distribution.

**BANDAR SUMATRA RUBBER.**—For the year to July 31 last, after debiting London administration charges and all upkeep of estates to revenue, the accounts show a credit balance of £9,758, and £1,820 was brought in, making £11,578. Deduct amount written off buildings and machinery account, £1,528, and reserve for taxes, £1,000, there remains £9,050. Owing to the condition of the rubber market the directors consider it advisable to withhold the payment of a dividend, and recommend that the balance be carried forward.

**BRAUNSTON (MALAY) RUBBER ESTATES.**—After writing off £1,119 for depreciation, the net profit for the year to Sept. 30 last amounts to £16,042, against £17,099 for 1918-19. An interim dividend of 7½ per cent. has been distributed, and £3,100 has been paid for E.P.D. for 1918-19, leaving (including £7,788 brought in) a balance of £14,392, which is subject to E.P.D. for 1919-20 and corporation tax. In view of the uncertain condition of the rubber industry, the board recommend that the above balance be carried forward. The

crop was 380,610 lb., compared with 363,000 lb. in the previous year. The net average price obtained, including the amount of rubber still unsold, viz., 15,709 lb. at an estimated value, was 1s. 11d. per pound. The "all-in" cost per pound, excluding renewals of buildings and machinery charged to revenue, was 1-90d., compared with 1s. 0-30d. in 1918-19.

**SENNAH RUBBER.**—For the year to June 30 last the profit, after writing off £2,871, loss on realisation of investments, amounts to £19,225, and £29,377 was brought in, making £48,602. In view of the adverse conditions at present affecting the rubber industry and the necessity of conserving financial resources, the directors do not recommend a dividend but propose to carry forward the balance. The rubber crop was 1,720,536 lb., being 229,464 lb. short of the estimate and 335,439 lb. in excess of the yield of the previous year. The average gross price realised was 1s. 11-50d. per pound. The yield for the current year was estimated at 2,040,000 pounds, but the company having assented to the R.G.A. scheme of restriction the actual crop may be expected not to exceed 1,680,000 pounds. The cost f.o.b. was 1s. 7-23d., against 1s. 7-00d. in 1918-1919, and "all-in" 1s. 8-63d., against 1s. 9-74d.

### New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2:—

**BURLAND, RICHARD, & SONS, LTD.** Oil refiners, grease manufacturers, &c. Nominal capital, £25,000 in 25,000 shares of £1 each. Directors: R. O. Burland, Mabel L. Jones, H. Burland, F. V. Waddington. Qualification of directors, 100 shares.

**CLAYTON GLUE WORKS, LTD.** Glue, grease, bone manure, general chemical manufacturers. Nominal capital, £40,000 in 40,000 shares of £1 each. Directors: A. Bomson, E. C. Witter. Qualification of directors, 1,000 shares. Remuneration of directors, £50 each.

### Contracts Let

**CROWN AGENTS FOR THE COLONIES.**—Boric acid, &c., T. Morson & Sons. Drugs, &c.: The British Drug Houses, Ltd.; Harker, Stagg & Morgan; Howards & Sons. Drugs: Burgoyne, Burbidges & Co.; May & Baker, Ltd. Fuel oil: Anglo-American Oil Co. Magnesium sulphate: Blyth & Co., Ltd. Novarseno benzol: May & Baker, Ltd. Oil: Vacuum Oil Co. Oleum terebinth: Prices Co., Ltd. Oleum ricini: The Premier Oil Extracting Mills.

### Contracts Open

Tenders are invited for the supply of the following materials (latest date for receiving tenders in parentheses):—

**BLACKBURN.**—(February 7): Pitch, creosote oil, black varnish, calcium carbide, oils, tallow, soap, soda, chloride of lime, chloros carboic acid powder or Izal. Tenders to A. T. Gooseman, Town Hall, Blackburn.

**MIDDLESBROUGH.**—(February 14): Pitch, tar, disinfectants, indiarubber goods, oils and varnishes. Forms from S. E. Burgess, M.I.C.E., and tenders to Town Clerk, both at Municipal Buildings, Middlesbrough.

**HENDON.**—(January 31): Standard tar (for one year), disinfectants, and about 35 tons sewage precipitant. Forms from A. O. Knight, A.M.I.C.E., and tenders to H. Humphris, both at Town Hall, Hendon, N.W.4.

**SUNBURY-ON-THAMES.**—(February 7): 12,000 gallons refined coal tar. Forms from Surveyor, and tenders to E. Beeching, Council Offices, Sunbury-on-Thames.

**STOCKPORT.**—(February 3): Creosote oil, pitch, and lime. Forms from and tenders to H. Hamer, A.M.I.C.E., Borough Surveyor's Office, Town Hall, Stockport.

**NORTHWOOD.**—(January 31): Distilled tar. Forms from H. R. Metcalfe, A.M.I.C.E. Tenders to E. R. Abbott, Council Offices, Northwood, Middlesex.

**LITTLEHAMPTON.**—(January 28): 35,000 gallons distilled tar, tarvia, and other compounds. Forms from R. E. Booker, 17, Woodlands Road, Littlehampton. Tenders to Arthur Shelley, Clerk, Littlehampton.

**JOHANNESBURG.**—(January 27): Creosote. Particulars from Enquiry Office, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (As the time for receipt of tenders is limited, this intimation will only be of use to firms having agents in the Union who can be instructed by cable).

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### London Gazette

#### Companies Winding Up Voluntarily

- BURMAH SOLID PETROLEUM FUEL CO., LTD. (in voluntary liquidation).—A general meeting will be held at 9, Throgmorton Avenue, London, E.C.2. on Tuesday, February 22, at 11.30 a.m. J. M. Hamilton, Liquidator.
- HIGH TEMPERATURE GENERATORS, LTD.—F. Morse, 1-2, Great Winchester Street, London, Liquidator.
- TRINIDAD OILFIELDS, LTD. (in voluntary liquidation).—A general meeting of members will be held at the offices of Messrs. Longcroft, Smith & Co., 2, Broad Street Place, London, E.C.2, on Monday, February 28, at 11 a.m. R. G. Longcroft, Liquidator.
- WAEN SILICA SAND CO., LTD.—A. Yearsley, 27, Brazen-nose Street, Manchester, Liquidator.

#### Liquidators' Notice

- DECOLOURISER CO., LTD. (in liquidation).—A general meeting of members will be held at the offices of Stowell and Bayley, 1, Booth Street, Manchester, on Thursday, February 17, at 3 p.m.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced since such date.]

- CHEMISTS' MANUFACTURING CO., LTD., LONDON, S.E.—Registered January 5, £15,000 debentures; general charge. \*Nil. December 31, 1919.
- LAMPLUGH IRON ORE CO., LTD., WHITEHAVEN.—Registered January 10, £500 debentures, part of £15,000; general charge. \*—, October 12, 1920.
- MARLEY HILL CHEMICAL CO., LTD., NEWCASTLE-ON-TYNE.—Registered January 4, £100,000 1st mortgage debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £23,000; general charge (except uncalled capital).
- TAR OILS, LTD., DUNSTABLE.—Registered January 7, £400 debentures, part of £10,000; general charge. \*Nil. May 18, 1920.
- WEST HENSBARROW CHINA CLAY CO., LTD., LONDON E.C.—Registered January 6, £1,000 debentures, part of £10,000; general charge.
- WIGAN ELECTRO-METALLURGICAL WORKS, LTD., LIVERPOOL.—Registered January 6, £186 10s. debenture, to British Thermit Co., Ltd., Liverpool; also registered January 6, £18,000 debentures; general charge. \*—, December 31, 1919.

#### Satisfaction

- ROMANA PETROLEUM CO., LTD. (late ANGLO-GALICIAN NAPHTHA SYNDICATE, LTD.), LONDON, E.C.—Satisfaction registered January 10, £5,500, part of £50,000, registered October 1, 1913.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

- TRESTRAIL, J. P.—The Pharmacy, Porthleven, chemist. £15 12s. 7d. December 8.

LONGMAN, WILFRED J.—Ham, Rocky Knapp, Dorchester Road, Weymouth, chemist. £25 19s. 8d. November 29.

LUNN, H. N.—402, Victoria Street, Grimsby, chemist. £10 7s. 7d. December 8.

BINNS BROTHERS, Worth Valley Soap Works, Keighley.—Soap manufacturers, £15 9s. 8d. December 8.

## Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. No.
Canada (Toronto)	Patented metal goods ... ..	36
Montreal ...	Soap ... ..	42
Auckland ...	Oils; colours; varnishes ... ..	45
Cape Town ...	Aluminium ... ..	—
Hamburg ...	Oils; fats; greases ... ..	63

## Tariff Changes

FIJI.—The export of copra is now permitted without licence.

GERMANY.—As from January, the Customs duty is payable on imports into Germany of vegetable wax (from palms, palm leaves, or the like) in a natural state; beeswax and wax from other insects, in a natural state, or roughly melted; officially denatured spirit, raw or purified, in casks or land wagons; beeswax and wax from other insects and vegetable wax, prepared (bleached, coloured, in cakes or balls, &c.), even mixed with other materials; sulphate of copper; sulphate of copper mixed with sulphate of iron; oxide of zinc; nitrate of ammonia, not imported in shells or capsules; nitrate of lead; casein, casein gum and similar preparations; india-rubber, dissolved, with or without admixture of resin; soft india-rubber paste, dyed or not, with or without admixture of asbestos fibres, graphite, or other material; rolled sheets thereof; and cuttings and strips of india-rubber, unmanufactured (all these not vulcanised). Importation of these products into Germany is still subject to import licence requirements.

LATVIA.—The following goods of "first necessity" may be freely imported into Latvia: Naphtha and its products, engine oil, artificial manure, and chemicals for industrial purposes. The importation of porcelain (except white) and articles made of crystal glass (except for chemical and scientific purposes) is prohibited.

NETHERLANDS.—The prohibition on the exportation of the following articles has been withdrawn: Acetone; beetroot waste; bone meal; Chinese wood oil; coal tar dyestuffs and all derivatives therefrom used in or applied to the process of dyeing; gypsum; lime and limestone; logwood and woods used for dyeing, and extracts thereof; petroleum, gas oil, liquid fuel, and benzine; pyrites; resin, asphalt, resinous matter, and products and mixtures thereof; shellac; train oil; and wood tar and pitch. Opium and its derivatives, i.e., raw opium, prepared opium, opium medicine, morphine, heroine, cocaine, &c., may still only be exported under licence from the Minister of Labour.

TUNIS.—The special extra tax on exports of phosphate (THE CHEMICAL AGE, January 15, page 78) is to be levied on the products of the transformation in Tunis (precipitated phosphates, superphosphates, and other products), according to the quantity of natural phosphate which they represent.

TURKEY.—The exportation of compounds of quinine, neo-salvarsan, and aspirin in tablets is prohibited.

Internal alterations at 380, High Road, Willesden, for the PEACHEY PROCESS CO., LTD., have been approved by the Willesden U.D.C.



